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The Resources Agency
DEPARTMENT OF FISH AND GAME

SOUTHERN CALIFORNIA COMMERCIAL PASSENGER FISHING VESSEL SAMPLING STUDY QUARTERLY REPORT NO. 13

July 1 - September 30, 1978

by

Stephen J. Crooke

MARINE RESOURCES

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SOUTHERN CALIFORNIA COMMERCIAL PASSENGER FISHING

VESSEL SAMPLING STUDY

QUARTERLY REPORT NO. 13 [1]

by

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ABSTRACT

Between July 1 and September 30, 1978, Departmental personnel sampled catches during 185 trips aboard commercial passenger fishing vessels (partyboats) operating in southern California. A total of 35,984 fishes representing 98 species were identified and measured. Otoliths for age determination studies were removed from 285 rockfish carcasses representing 18 species. In addition, 10 long-range trips originating in San Diego and fishing in Mexican waters were sampled. A total of 957 fishes comprising 17 species were identified and measured at dockside from these vessels.

The ten most commonly taken species during the quarter accounted for 83.5% of the southern California catch. The most frequently sampled species were Pacific mackerel, *Scomber japonicus* (26.5%); kelp bass, *Paralabrax clathratus* (20.5%); bocaccio, *Sebastes paucispinis* (8.2%); Pacific bonito, *Sarda chiliensis* (7.7%); barred sand bass, *P. nebulifer* (6.7%); olive rockfish, *Sebastes serranoides* (4.9%); white croaker, *Genyonemus lineatus* (2.9%); blue rockfish, *S. mystinus* (2.7%); chilipepper, *S. goodei* (1.8%); and albacore, *Thunnus alalunga* (1.7%). Data gathered from long-range vessels showed the top five species accounted for 92.6% of the fish sampled. The most frequently sampled species were yellowtail, *Seriola dorsalis* (61.5%); wahoo, *Acanthocybium solanderi* (11.7%); albacore (8.3%); yellowfin tuna, *T. albacares* (6.8%); and giant sea bass, *Stereolepis gigas* (4.4%).

1/ Marine Resources Administrative Report No. 79-15, December 1979. This study is being performed as part of Dingell-Johnson Project California F-35-P, "Southern California Marine Sportfish Research" supported by Federal aid to Fish Restoration Funds. Field work was conducted in cooperation with the Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, under a contract entitled Collection and Compilation of Southern California Partyboat Fishery Statistics, Project 868.

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INTRODUCTION

Between July 1 and September 30, 1978, Departmental personnel sampled catches during 185 trips aboard commercial passenger fishing vessels (partyboats) operating in southern California. A total of 35,984 fishes representing 98 species were identified and measured.[3/] Otoliths for age determination studies were removed from 285 rockfish carcasses representing 18 species. In addition, 10 long-range trips originating in San Diego and fishing in Mexican waters were sampled. A total of 957 fishes comprising 17 species were identified and measured at dockside from these vessels.

The ten most commonly taken species during the quarter accounted for 83.5% of the southern California catch (Table 1). The most frequently sampled species were Pacific mackerel, *Scomber japonicus* (26.5%); kelp bass, *Paralabrax clathratus* (20.5%); bocaccio, *Sebastes paucispinis* (8.2%); Pacific bonito, *Sarda chiliensis* (7.7%); barred sand bass, *P. nebulifer* (6.7%); olive rockfish, *Sebastes serranoides* (4.9%); white croaker, *Genyonemus lineatus* (2.9%); blue rockfish, *S. mystinus* (2.7%); chilipepper, *S. goodei* (1.8%); and albacore, *Thunnus alalunga* (1.7%). Data gathered from long-range vessels showed the top five species accounted for 92.6% of the fish sampled (Table 2). The most frequently sampled

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[3/] For definition of length measurements see Maxwell and Schultze, Administrative Report 76-3.

species were yellowtail, *Seriola dorsalis* (61.5%); wahoo, *Acanthocybium solanderi* (11.7%); albacore (8.3%); yellowfin tuna, *T. albacares* (6.8%); and giant sea bass, *Stereolepis gigas* (4.4%).

ROCKFISHES

During the quarter 9,339 rockfishes (*Sebastes* spp.) representing 36 species were identified and measured. They accounted for 26.0% of the fish taken, the lowest quarterly share since the inception of the program. The decline in the importance of rockfishes is the result of changes in our sampling program initiated in September 1977 (placing equal weight on all types of trips with the major emphasis no longer on rockfish trips). The top 10 species of rockfishes comprised 87.8% of the catch, up 0.3% from the previous quarter and down 3.9% from the same quarter in 1977. Greater diversification and increased catches of "minor" species (36 vs. 32 in 1977) accounted for the decline in the dominance of the top 10 rockfishes.

Bocaccio was the most frequently sampled rockfish accounting for 31.4% of the take. During the previous quarter it accounted for 38.9% of the catch while throughout the third quarter of 1977 it accounted for only 6.4% of the catch. The dramatic rise in the importance of bocaccio since the summer of 1977 can be attributed to a switch in fishing effort. Small fish (1976 year class) were not accessible in 1977 but were readily available in 1978, thus allowing boats to switch from olive rockfish (the most frequently caught rockfish in 1977) to bocaccio. Decreased availibility of olive rockfish may also have accentuated the switch. The average length of bocaccio taken ($\bar{x}$ length = 35.6 cm) declined 6.2 cm from the previous quarter ($\bar{x}$ length = 41.8 cm) and 3.9 cm from the same quarter last year ($\bar{x}$ length = 40.5 cm). The declines can be attributed to the

strong influence of the 1976 year class (the mode at 30 cm) since their small size would tend to depress the mean (Figures 1-3). Olive rockfish taken this quarter averaged 31.5 cm in length (Figures 4-6) while those taken during the same period in 1977 averaged 29.6 cm. No data are available from the previous quarter for comparison. Blue rockfish measured during the quarter averaged 28.9 cm in length (Figures 7-9) while those taken during the summer of 1977 averaged 27.6 cm. The blue rockfish taken the previous quarter averaged 29.3 cm. Data on chilipepper showed they averaged 33.6 cm in length this quarter (Figures 10-12) while during the previous quarter they averaged 40.4 cm. No data are available from 1977.

SURFACE GAMEFISHES

Among the top 10 fishes, five surface gamefishes accounted for 63.1% of the catch. This represents an increase of 7.3% over the same quarter in 1977 when surface gamefishes in the top 10 fishes accounted for 55.8%. The increase can be attributed to a 50.6% increase in Pacific mackerel catches while other catch rates remained relatively constant.

Pacific mackerel catches reflected the dominance of the 1974 and 1976 year classes (Figures 13-15). The 1974 year class was represented by a mode at 40 cm while the 1976 year class was reflected by a mode at 33 cm. The two year classes were also dominant during the same quarter in 1977 as well as the previous quarter. Kelp bass taken during the quarter averaged 30.7 cm (Figures 16-18) while those taken a year ago averaged 34.5 cm in length. The decline in average length can be attributed to a greater proportion of "shorts" in this year's catch. Fish taken the previous quarter were 1.8 cm longer ($\bar{x}$ = 32.5 cm) than those taken this quarter. Lack of "shorts" the previous quarter is responsible for this. During July, bonito catches were dominated by the 1977 year class with a mode

distributed about 47-48 cm (Figures 19-21). Throughout August and September, the 1978 year class was dominant with a mode distributed around 36-37 cm. With the decline in the 1977 year class, the 1978 year class will now dominate the fishery. Barred sand bass taken during the quarter averaged 35.4 cm in length (Figures 22-24). This compares closely with fish taken last quarter ($\bar{x}$ length = 35.5 cm) and those taken the same quarter last year ($\bar{x}$ length = 35.8 cm). White croakers measured during the quarter averaged 26.0 cm in length (Figures 25-27). This was a decrease of 0.8 cm from last quarter ($\bar{x}$ length = 26.8 cm). Albacore catches (Figures 28-30) were dominated by III and IV year old fish as evidenced by a mode at 77-83 cm. No data are available from previous quarters. Barracuda, *Sphyraena argentea*, catches (Figures 31-33) during August and September were dominated by the 1974 year class (represented by a mode at 68-70 cm). The 1976 year class was also noticeable as a mode at 55-57 cm while the lack of fish at 59-61 cm continues to indicate the poor strength of the 1975 year class.

BAJA CALIFORNIA FISHERY

The average size of yellowtail (Figures 34-35) taken during the quarter ($\bar{x}$ length = 81.7 cm) decreased 10.4 cm from those taken the previous quarter ($\bar{x}$ length = 92.1 cm). The length histogram for July showed that the 1975 ($\bar{x}$ length $\cong$ 62 cm) and 1976 ($\bar{x}$ length $\cong$ 69 cm) year classes were missing from the fishery. However, in September the 1975 year class made a stronger showing which would tend to indicate that only the 1976 year class is a weak one. Wahoo (Figures 36-37) taken this quarter ($\bar{x}$ length = 137.5 cm) were 18.8 cm longer than those taken last quarter ($\bar{x}$ length = 118.7 cm). The change in size could be attributed to a switch in fishing areas with the larger fish coming from Thetis Bank. Albacore measured in July averaged 77.2 cm in length and were composed of III and IV year old fish (Figure 40).

Yellowfin tuna taken this quarter averaged 85.6 cm in length while those taken during the past summer were 79.4 cm long (Figures 41-42). Giant sea bass sampled this quarter averaged 135.0 cm (Figures 43-44). No data are available for the previous quarter.

EFFORT AND CATCH-PER-UNIT-EFFORT

The average number of anglers per trip (effort) remained relatively stable during the quarter (Table 4). An increase in passengers was noted in August followed by a decline in September, a phenomenon which closely follows the vacation pattern of southern California anglers. Previous sampling (Table 5) indicates that July has usually been the heaviest month for sportfishing.

Catch-per-unit-effort was up for July and August when compared to the two previous seasons. In September it declined slightly when compared with last season. Increased catches of Pacific mackerel are responsible for the increase in CPUE. Without them, it would not be as high as it was this year or in 1977. It would probably look similar to 1976 when mackerel catches were low.

REFERENCES

Crooke, Stephen J. 1978. Southern California partyboat sampling study, quarterly report no. 9. Calif. Dept. Fish and Game, Mar. Res. Admin. Rept., 78-7:1-31.

_____. 1979. Southern California partyboat sampling study, quarterly report no. 12. Calif. Dept. Fish and Game, Mar. Res. Admin. Rept., 79-12:1-67.

TABLE 1. Number of Fishes Measured from Southern California Commercial Passenger Fishing Vessels, July through September 1978.

Common name	Scientific name	Number measured	Common name	Scientific name	Number measured
Shark, thresher	*Alopias vulpinus*	1	Rockfish, gopher	*Sebastes carnatus*	162
Surfperch, barred	*Amphistichus argenteus*	3	Rockfish, copper	*S. caurinus*	431
Sargo	*Anisotremus davidsonii*	8	Rockfish, greenspotted	*S. chlorostictus*	107
Sablefish	*Anoplopoma fimbria*	57	Rockfish, black & yellow	*S. chrysomelas*	39
Topsmelt	*Atherinops affinis*	7	Rockfish, starry	*S. constellatus*	137
Jacksmelt	*Atherinopsis californiensis*	7	Rockfish, calico	*S. dalli*	121
Seabass, white	*Atractoscion nobilis*	47	Rockfish, splitnose	*S. diploproa*	1
Triggerfish, finescale	*Balistes polylepis*	2	Rockfish, greenstriped	*S. elongatus*	23
Whitefish, ocean	*Caulolatilus princeps*	170	Rockfish, swordspine	*S. ensifer*	2
Shark, swell	*Cephaloscyllium ventriosum*	3	Rockfish, widow	*S. entomelas*	232
Croaker, black	*Cheilotrema saturnum*	11	Rockfish, pink	*S. eos*	40
Blacksmith	*Chromis punctipinnis*	4	Rockfish, yellowtail	*S. flavidus*	13
Sanddab, Pacific	*Citharichthys sordidus*	19	Rockfish, bronzespotted	*S. gilli*	6
Flyingfish, California	*Cypselurus californicus*	1	Chilipepper	*S. goodei*	649
Sole, petrale	*Eopsetta jordani*	14	Rockfish, rosethorn	*S. helvomaculatus*	8
Skipjack	*Euthynnus pelamis*	76	Rockfish, squarespot	*S. hopkinsi*	414
Shark, soupfin	*Galeorhinus zyopterus*	1	Cowcod	*S. levis*	5
Croaker, white	*Genyonemus lineatus*	1056	Rockfish, Mexican	*S. macdonaldi*	1
Opaleye	*Girella nigricans*	4	Rockfish, blackgill	*S. melanostomus*	20
Wrasse, rock	*Halichoeres semicinctus*	1	Rockfish, vermilion	*S. miniatus*	316
Kelpfish, giant	*Heterostichus rostratus*	25	Rockfish, blue	*S. mystinus*	969
Sole, bigmouth	*Hippoglossina stomata*	5	Rockfish, speckled	*S. ovalis*	4
Ratfish	*Hydrolagus colliei*	3	Bocaccio	*S. paucispinis*	2938
Shark, bonito	*Isurus oxyrinchus*	3	Rockfish, chameleon	*S. phillipsi*	12
Sole, [illegible]	*[illegible]*	2	Rockfish, canary	*S. pinniger*	27
Halfmoon	*Medialuna californiensis*	100	Rockfish, [illegible]	*S. [illegible]*	38
Hake, Pacific	*Merluccius productus*	7	Rockfish, rosy	*S. rosaceus*	161
Smoothhound, brown	*Mustelus henlei*	1	Rockfish, greenblotched	*S. rosenblatti*	14
Ray, bat	*Myliobatis californica*	1	Rockfish, flag	*S. rubrivinctus*	54
Salmon, silver	*Oncorhynchus kisutch*	1	Rockfish, bank	*S. rufus*	80
Lingcod	*Ophiodon elongatus*	107	Rockfish, olive	*S. serranoides*	1758
Senorita	*Oxyjulis californica*	12	Treefish	*S. serriceps*	86
Bass, kelp	*Paralabrax clathratus*	7386	Rockfish, honeycomb	*S. umbrosus*	77
Bass, spotted sand	*P. maculatofasciatus*	7	Sheephead, California	*Semicossyphus pulcher*	217
Bass, barred sand	*P. nebulifer*	2419	Yellowtail	*Seriola dorsalis*	179
Halibut, California	*Paralichthys californicus*	233	Queenfish	*Seriphus politus*	92
Surfperch, white	*Phanerodon furcatus*	2	Barracuda, California	*Sphyraena argentea*	550
Thornback	*Platyrhinoidis triseriata*	5	Dogfish, spiny	*Squalus acanthias*	6
Turbot, C-O	*Pleuronichthys ocellatus*	2	Sea bass, giant	*Stereolepis gigas*	3
Shark, blue	*Prionace glauca*	73	Needlefish, California	*Strongylura exilis*	1
Skate, longnose	*Raja rhina*	1	Lizardfish, California	*Synodus lucioceps*	131
Surfperch, rubberlip	*Rhacochilus toxotes*	1	Albacore	*Thunnus alalunga*	607
Guitarfish, shovelnose	*Rhinobatos productus*	8	Tuna, yellowfin	*T. albacares*	5
Bonito, Pacific	*Sarda chiliensis*	2750	Tuna, bluefin	*T. thynnus*	12
Mackerel, Pacific	*Scomber japonicus*	9529	Mackerel, jack	*Trachurus symmetricus*	93
Sculpin	*Scorpaena guttata*	598	Croaker, yellowfin	*Umbrina roncador*	6
Cabezon	*Scorpaenichthys marmoratus*	18	Salema	*Xenistius californiensis*	2
Rockfish, kelp	*Sebastes atrovirens*	334	Sole, fantail	*Xystreurys liolepis*	1
Rockfish, brown	*S. auriculatus*	59			
Rockfish, redbanded	*S. babcocki*	1	TOTAL		35,984

TABLE 2. Number of Fishes Measured from Long-Range Commercial Passenger Fishing Vessels, July through September 1978.

Common name	Scientific name	Number measured	Common name	Scientific name	Number measured
Wahoo	*Acanthocybium solanderi*	112	Rock bass, golden spotted	*Paralabrax auroguttatus*	6
Seabass, white	*Atractoscion nobilis*	2	Halibut, California	*Paralichthys californicus*	1
Jack, crevalle	*Caranx hippos*	1	Yellowtail	*Seriola dorsalis*	588
Dolphinfish, common	*Coryphaena hippurus*	22	Barracuda, California	*Sphyraena argentea*	2
Cabrilla, spotted	*Epinephelus analogus*	1	Sea bass, giant	*Stereolepis gigas*	42
Grouper, snowy	*E. niveatus*	28	Albacore	*Thunnus alalunga*	79
Skipjack, black	*Euthynnus lineatus*	3	Tuna, yellowfin	*T. albacares*	65
Skipjack	*E. pelamis*	2	Tuna, bluefin	*T. thynnus*	1
Grouper, broomtail	*Mycteroperca xenarcha*	2	TOTAL		957

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Skipjack	*E. pelamis*	2	Tuna, bluefin	*T. thynnus*	1
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TABLE 3. Species Composition of Rockfishes (*Sebastes* spp.) Catches from Commercial Passenger Fishing Vessel Samples, July through September 1978.

Common name	Scientific name	Frequency of occurrence (%)
Bocaccio	*Sebastes paucispinis*	31.5
Olive	*S. serranoides*	18.8
Blue	*S. mystinus*	10.4
Chilipepper	*S. goodei*	6.9
Copper	*S. caurinus*	4.6
Squarespot	*S. hopkinsi*	4.4
Kelp	*S. atrovirens*	3.6
Vermilion	*S. miniatus*	3.4
Widow	*S. entomelas*	2.5
Gopher	*S. carnatus*	1.7
Rosy	*S. rosaceus*	1.7
Starry	*S. constellatus*	1.5
Calico	*S. dallii*	1.3
Greenspotted	*S. chlorostictus*	1.1
Treefish	*S. serriceps*	0.9
Bank	*S. rufus*	0.9
Honeycomb	*S. umbrosus*	0.8
Brown	*S. auriculatus*	0.6
Flag	*S. rubrivinctus*	0.6
Pink	*S. eos*	0.4
Black & Yellow	*S. chrysomelas*	0.4
Grass	*S. rastrelliger*	0.4
Canary	*S. pinniger*	0.3
Greenstriped	*S. elongatus*	0.2
Blackgill	*S. melanostomus*	0.2
Greenblotched	*S. rosenblatti*	0.1
Yellowtail	*S. flavidus*	0.1
Chameleon	*S. phillipsi*	0.1
Rosethorn	*S. helvomaculatus*	<0.1
Bronzespotted	*S. gilli*	<0.1
Cowcod	*S. levis*	<0.1
Speckled	*S. ovalis*	<0.1
Swordspine	*S. ensifer*	<0.1
Splitnose	*S. diploproa*	<0.1
Mexican	*S. macdonaldi*	<0.1
Redbanded	*S. babcocki*	<0.1

TABLE 4. Effort and Catch Per-Unit-Effort Values Determined from Commercial Passenger Fishing Vessel Samples for Each Port Complex and Month, January through September 1978.

	Port complex	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
No. trips/month										
	1	8	10	12	4	4	14	21	24	16
	2	5	5	6	2	6	10	9	8	8
	3	2	6	6	3	4	8	7	3	3
	4	6	10	6	9	9	9	13	7	6
	5	9	9	8	10	9	15	7	12	8
	6	11	10	12	11	9	12	11	13	9
TOTAL		41	50	50	39	41	68	68	67	50
Avg. no. anglers/trip										
	1	22.87	20.50	22.25	16.50	32.75	26.79	32.90	40.12	31.19
	2	16.60	28.40	24.67	28.00	32.17	28.80	34.40	35.87	31.50
	3	23.00	20.50	28.83	13.33	25.00	34.25	32.29	37.00	25.33
	4	24.83	28.90	30.67	33.44	44.67	37.11	35.08	40.71	38.00
	5	25.78	30.44	30.50	22.70	29.22	22.60	33.14	34.08	27.87
	6	24.45	22.30	20.33	27.82	33.33	28.25	27.18	31.23	24.78
Average		23.00	25.00	25.00	25.00	33.00	29.00	32.00	36.00	30.00
No. fish caught/angler hour fished										
	1	1.74	2.00	1.69	1.68	3.28	1.74	0.94	0.79	0.92
	2	2.74	2.53	0.79	2.64	1.48	1.44	1.99	2.79	2.98
	3	1.26	1.43	0.83	1.31	1.78	1.95	1.61	1.54	1.42
	4	2.56	2.68	2.23	1.70	1.18	1.64	1.62	1.87	2.37
	5	2.90	2.64	1.56	1.25	1.88	2.10	1.49	1.51	1.75
	6	1.78	2.00	2.66	2.55	2.33	1.15	1.42	1.49	1.39
Average		2.20	2.25	1.76	1.85	1.79	1.63	1.41	1.38	1.61

TABLE 5. Effort and Catch per-Unit-Effort Values Determined from Commercial Passenger Fishing Vessel Samples for Each Port Complex and Month, January 1976 Through December 1977.

1976

	Port complex	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No. trips/month													
	1	7	8	8	10	10	11	0	4	12	8	14	11
	2	7	5	7	7	10	9	5	7	5	2	4	6
	3	3	2	2	2	3	4	3	2	2	4	6	4
	4	7	5	6	9	10	8	13	9	8	9	7	8
	5	11	16	12	11	9	8	12	13	6	7	14	12
	6	10	11	12	9	9	8	10	16	10	13	15	15
TOTAL		45	47	47	48	51	48	43	51	43	43	60	56
Avg. no. anglers/trip													
	1	29.71	19.25	28.63	20.50	48.10	44.55	-	46.00	28.66	23.88	15.64	18.30
	2	26.57	23.00	20.57	21.57	30.20	36.89	51.20	45.71	29.60	21.50	18.50	19.70
	3	22.33	22.00	11.50	23.00	21.67	45.50	44.33	36.50	38.50	19.50	33.17	23.30
	4	30.57	29.00	26.17	25.33	26.20	39.38	43.23	49.11	30.75	27.20	25.28	27.50
	5	22.00	23.44	29.58	29.00	31.56	35.38	39.67	39.92	25.83	23.70	24.21	21.90
	6	16.40	25.64	23.83	22.89	26.22	27.13	43.30	38.44	24.00	21.46	18.00	19.60
Average		24.91	23.32	23.38	24.06	31.96	37.90	43.26	42.22	28.14	23.30	21.30	21.50
No. fish caught/angler hour fished													
	1	1.20	1.36	1.20	0.95	1.28	2.07	-	0.40	0.70	1.14	2.45	2.21
	2	1.47	1.16	1.16	0.73	0.92	1.13	0.92	0.44	0.39	1.21	2.09	1.66
	3	1.25	0.50	2.16	1.47	0.67	0.70	0.43	0.55	0.55	0.89	1.61	1.00
	4	1.87	1.77	1.48	1.67	0.80	0.94	0.76	0.80	1.18	2.07	2.19	2.19
	5	3.28	2.77	2.51	1.97	1.47	0.74	0.69	1.05	1.09	1.00	1.66	2.54
	6	3.55	1.80	1.92	1.41	2.33	1.03	0.58	0.87	1.43	1.96	3.19	2.92
Average		2.15	1.69	1.74	1.42	1.23	1.13	0.70	0.77	0.96	1.62	2.24	2.28

1977

	Port complex	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
No. trips/month													
	1	1	3	7	10	8	10	12	9	8	9	8	5
	2	6	2	2	2	3	5	9	11	12	7	7	6
	3	4	3	2	2	3	5	5	5	4	5	4	3
	4	7	4	4	7	12	10	11	13	11	12	13	10
	5	10	5	8	7	8	6	9	12	16	13	16	9
	6	14	11	7	10	7	10	10	11	16	14	13	12
TOTAL		42	28	30	38	41	46	56	61	67	60	61	45
Avg. no. anglers/trip													
	1	17.00	56.00	24.00	30.30	18.62	27.70	42.58	50.00	36.87	17.44	23.00	17.60
	2	18.33	32.50	23.00	24.00	19.67	30.40	40.78	40.55	22.00	27.29	21.57	28.67
	3	25.75	27.67	22.00	15.00	27.33	35.20	36.20	32.80	23.50	21.60	32.50	20.00
	4	28.57	32.50	24.00	33.00	31.17	42.80	41.27	29.54	28.27	23.58	35.08	27.90
	5	21.60	36.00	22.87	33.29	17.50	20.50	28.00	24.50	22.75	21.08	18.94	18.00
	6	19.00	30.45	26.14	25.50	23.14	12.30	31.20	41.82	22.75	14.40	18.62	13.50
Average		21.00	34.00	22.00	28.00	23.00	32.00	37.00	36.00	26.00	20.00	24.00	22.00
No. fish caught/angler hour fished													
	1	1.85	1.35	0.89	0.98	1.29	0.98	1.10	0.98	1.30	1.61	2.41	2.82
	2	1.11	0.48	1.77	0.22	0.96	2.18	0.87	1.02	1.13	0.89	1.48	1.45
	3	1.03	0.66	1.86	0.60	1.00	1.20	0.62	1.29	1.06	2.07	1.98	1.33
	4	2.95	2.30	1.19	1.55	1.70	1.60	1.11	1.50	1.58	2.22	1.48	2.77
	5	2.40	0.88	2.30	1.07	0.47	1.00	0.96	1.74	1.70	2.24	1.82	1.78
	6	4.04	1.54	1.11	1.64	1.05	0.59	1.29	1.40	2.36	2.50	2.34	2.05
Average		2.61	1.29	1.44	1.21	1.21	1.25	1.04	1.30	1.63	1.98	1.83	2.13

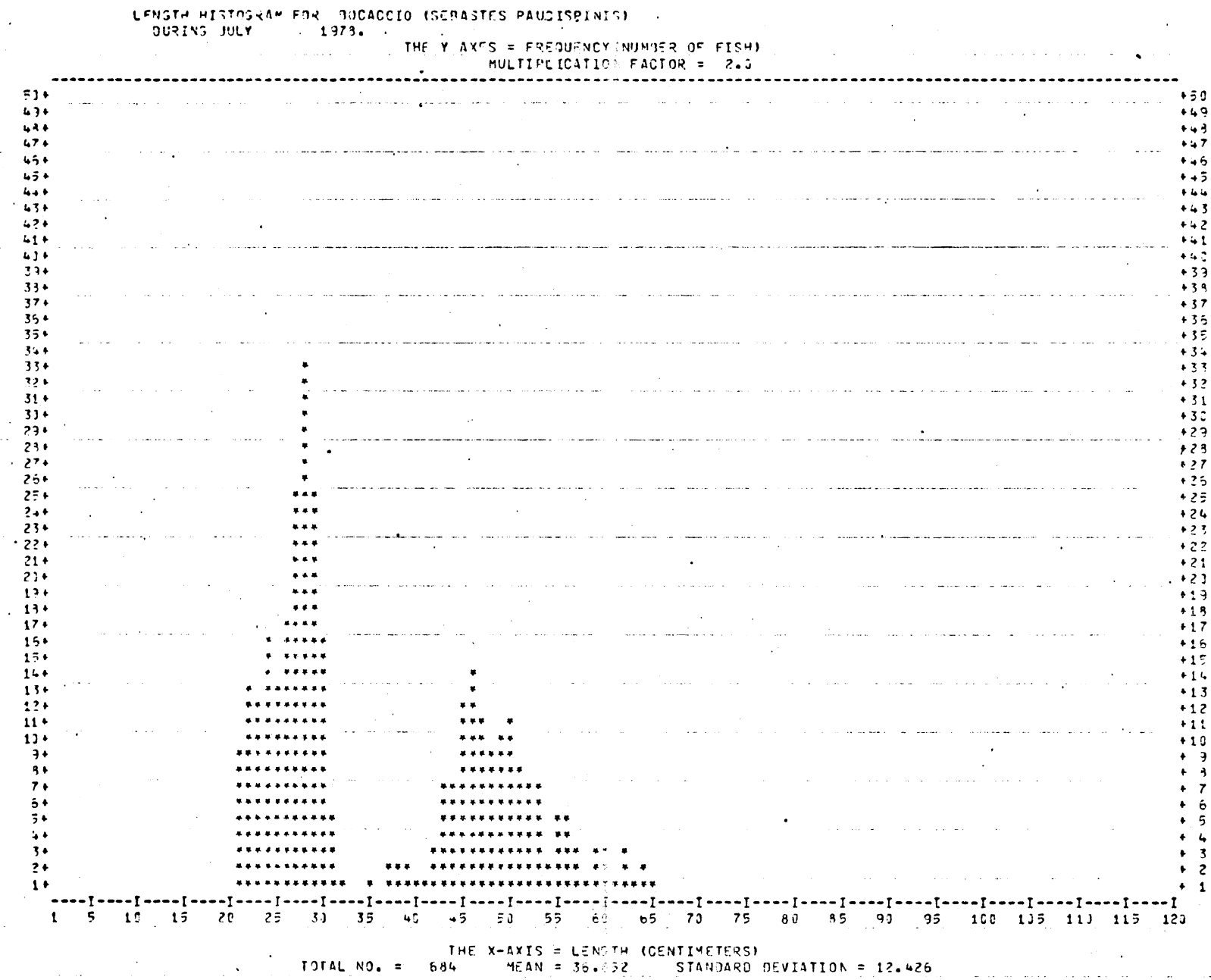


FIGURE 1. Length frequencies of bocaccio for July 1978.

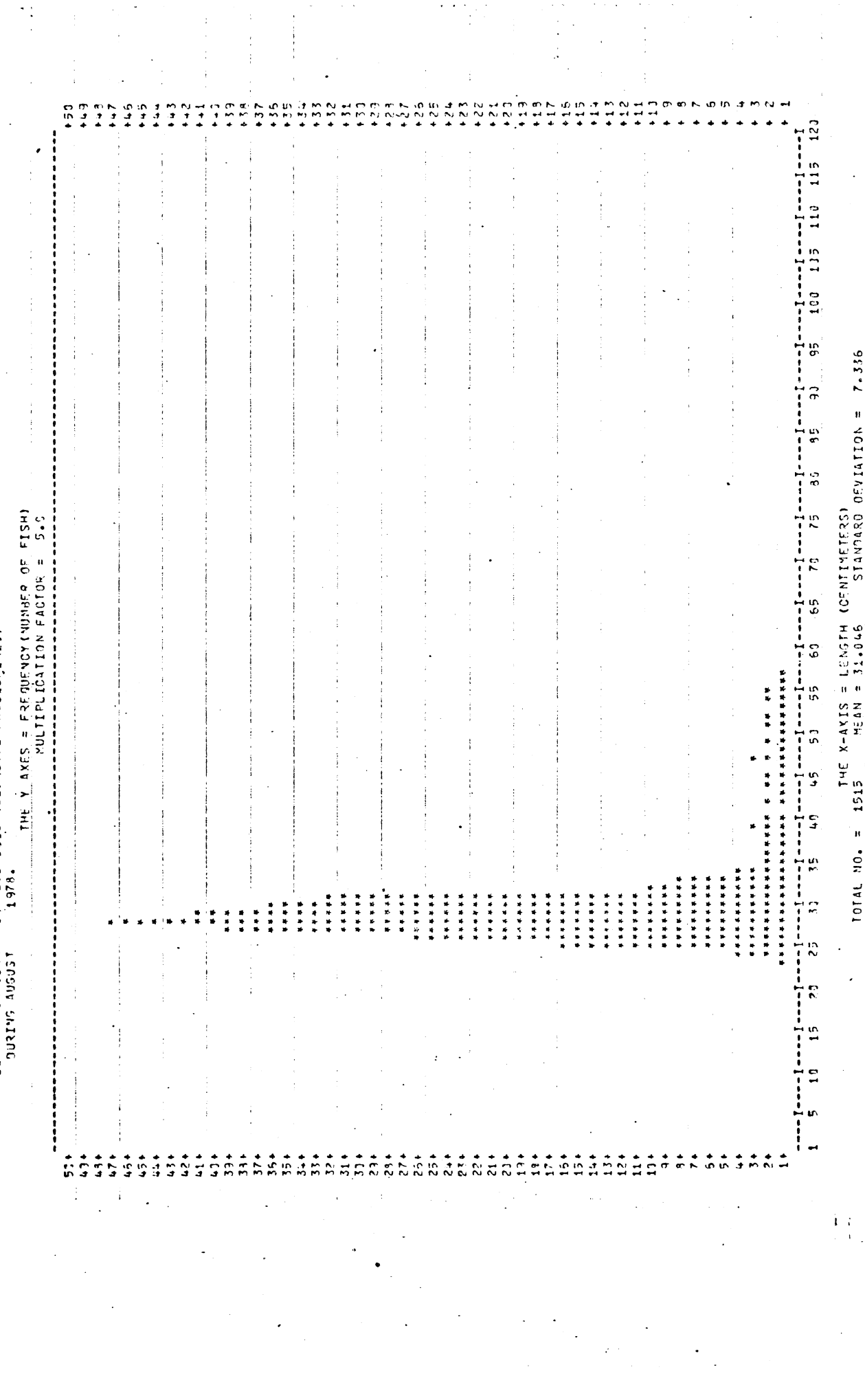


FIGURE 2. Length frequencies of bocaccio for August 1978.

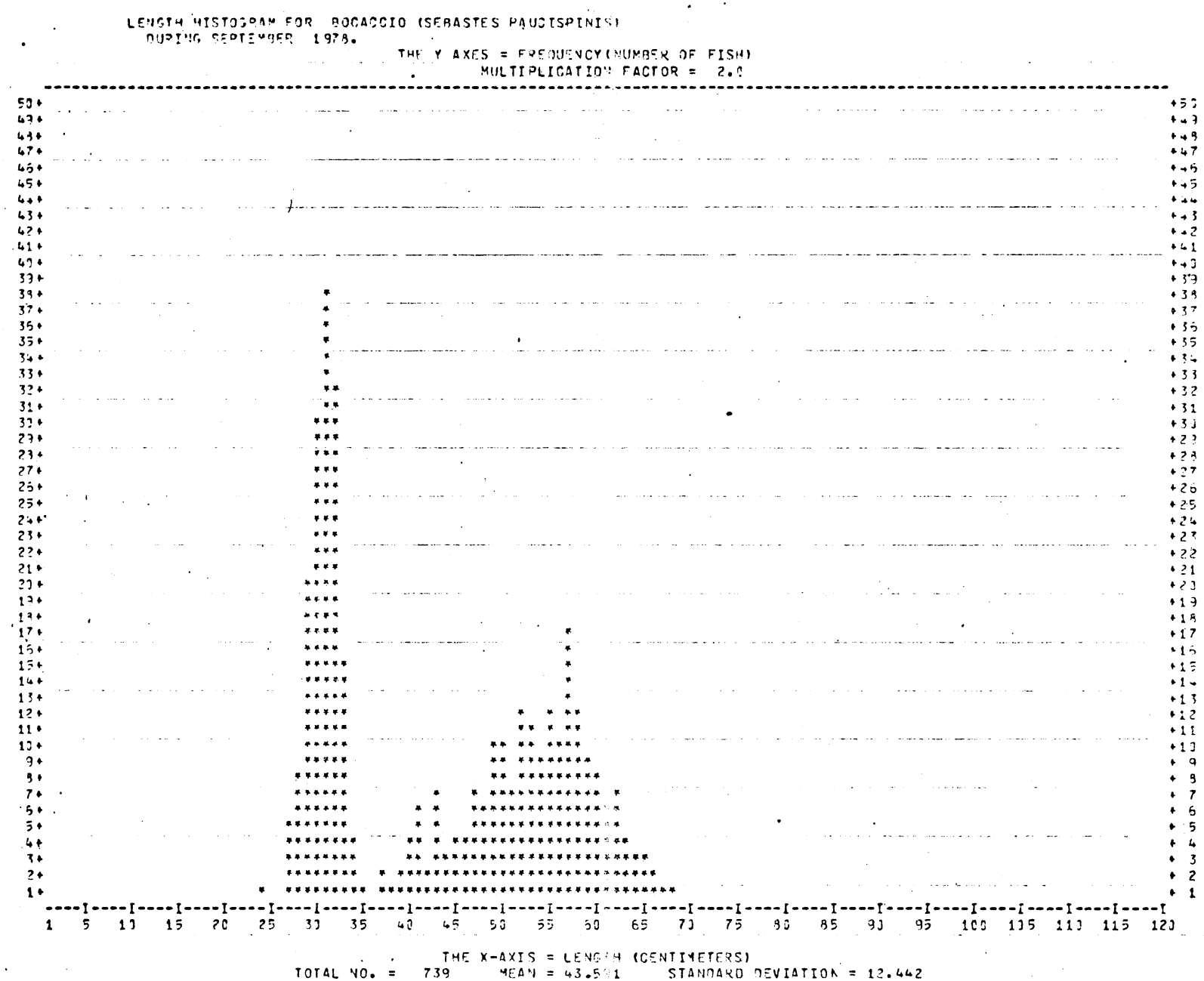


FIGURE 3. Length frequencies of bocaccio for September 1978.
Total No. Quarter 2,938 Mean Length Quarter 35.554 cm

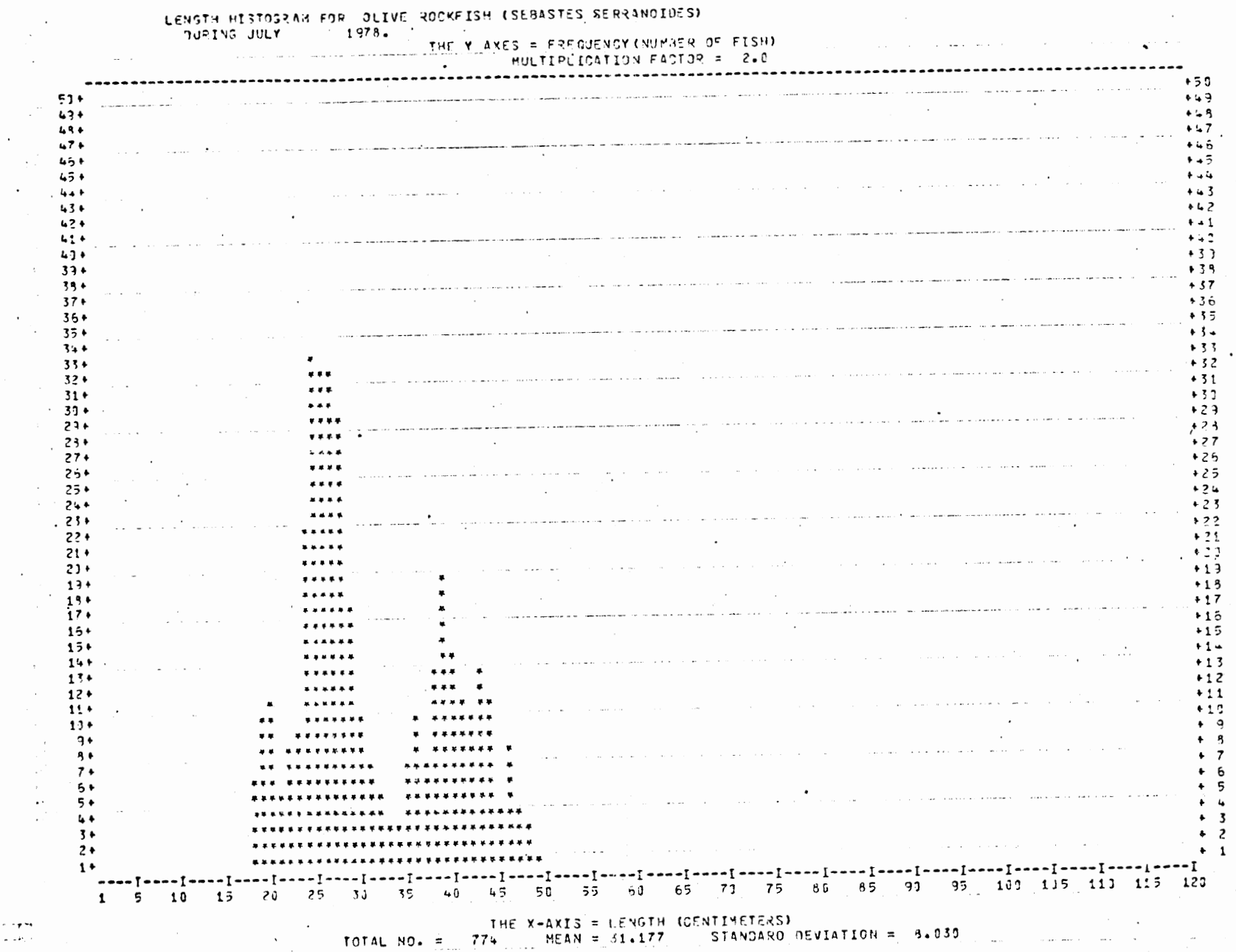


FIGURE 4. Length frequencies of olive rockfish for July 1978.

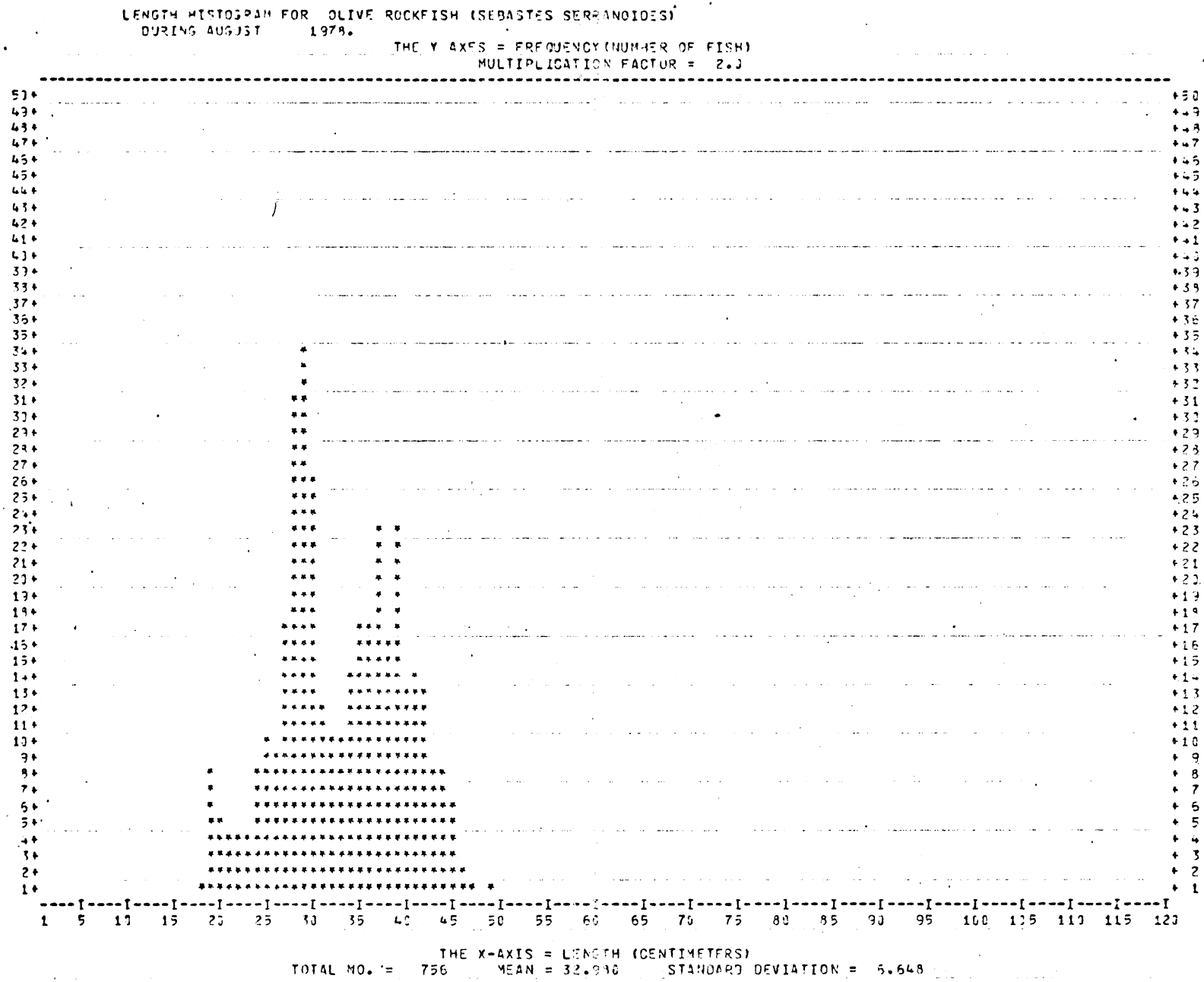


FIGURE 5. Length frequencies of olive rockfish for August 1978.

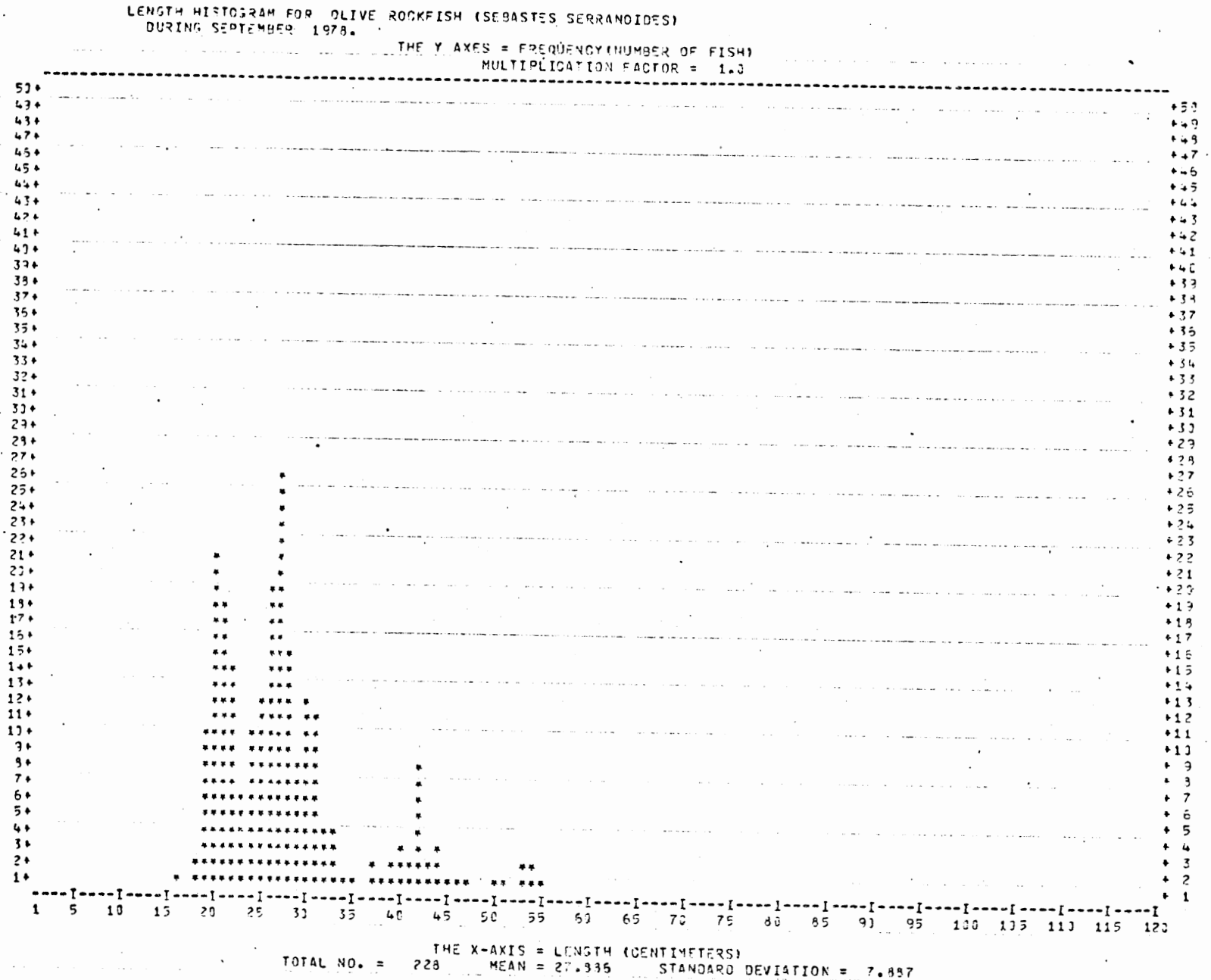


FIGURE 6. Length frequencies of olive rockfish for September 1978.
Total No. Quarter 1,758 Mean Length Quarter 31.526 cm

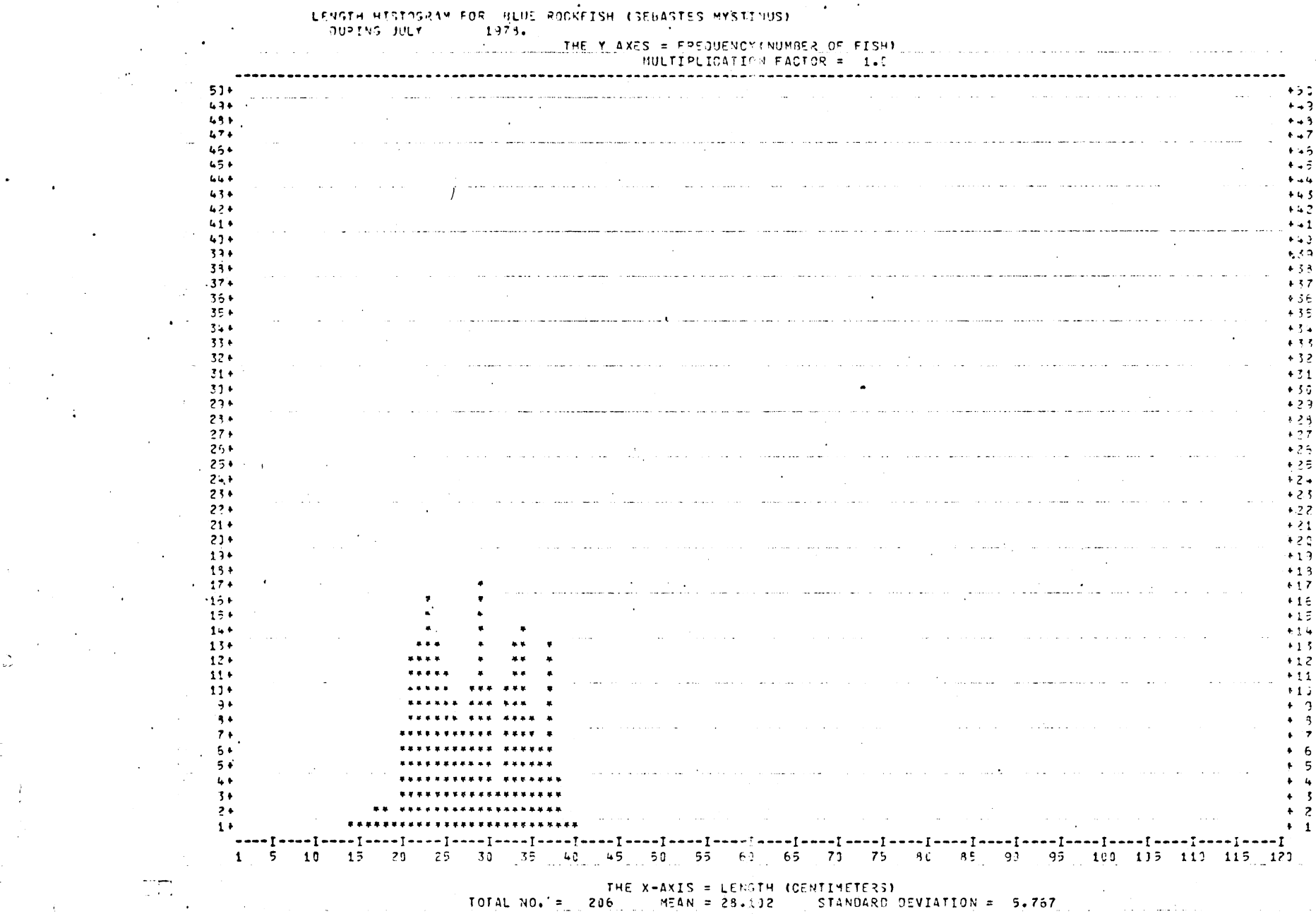


FIGURE 7. Length frequencies of blue rockfish for July 1978.

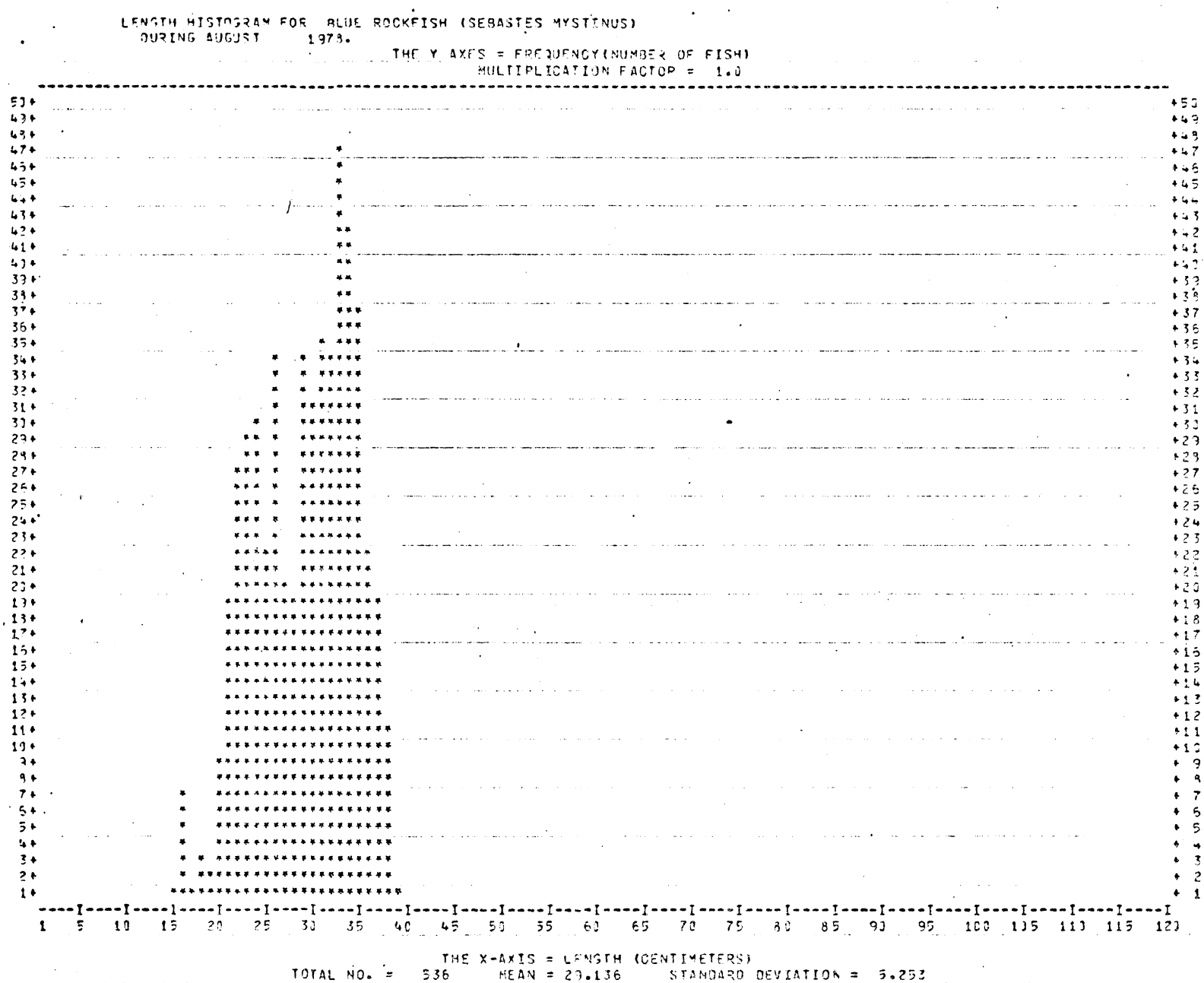


FIGURE 8. Length frequencies of blue rockfish for August 1978.

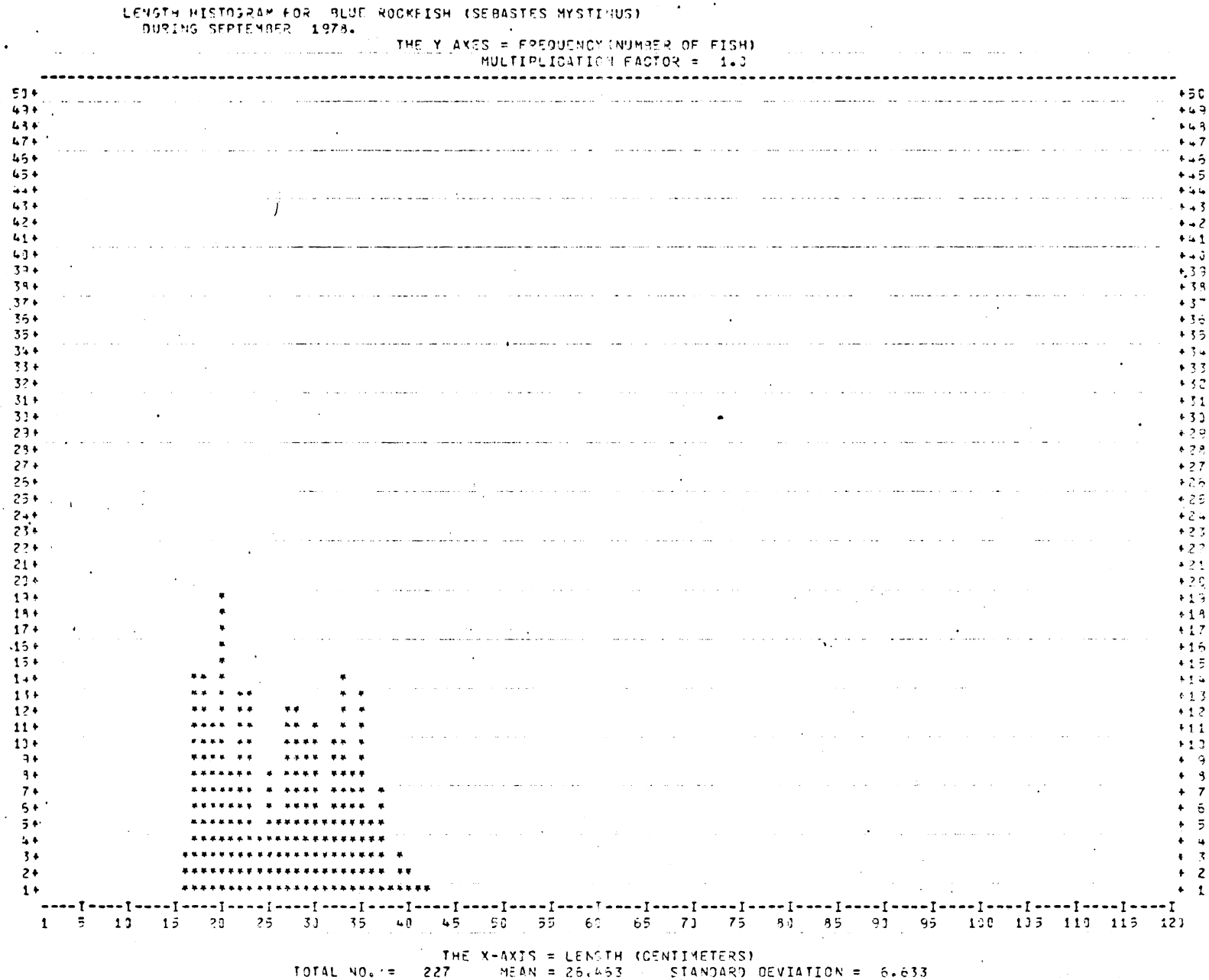


FIGURE 9. Length frequencies of blue rockfish for September 1978.
Total No. Quarter 969 Mean Length Quarter 28.290 cm

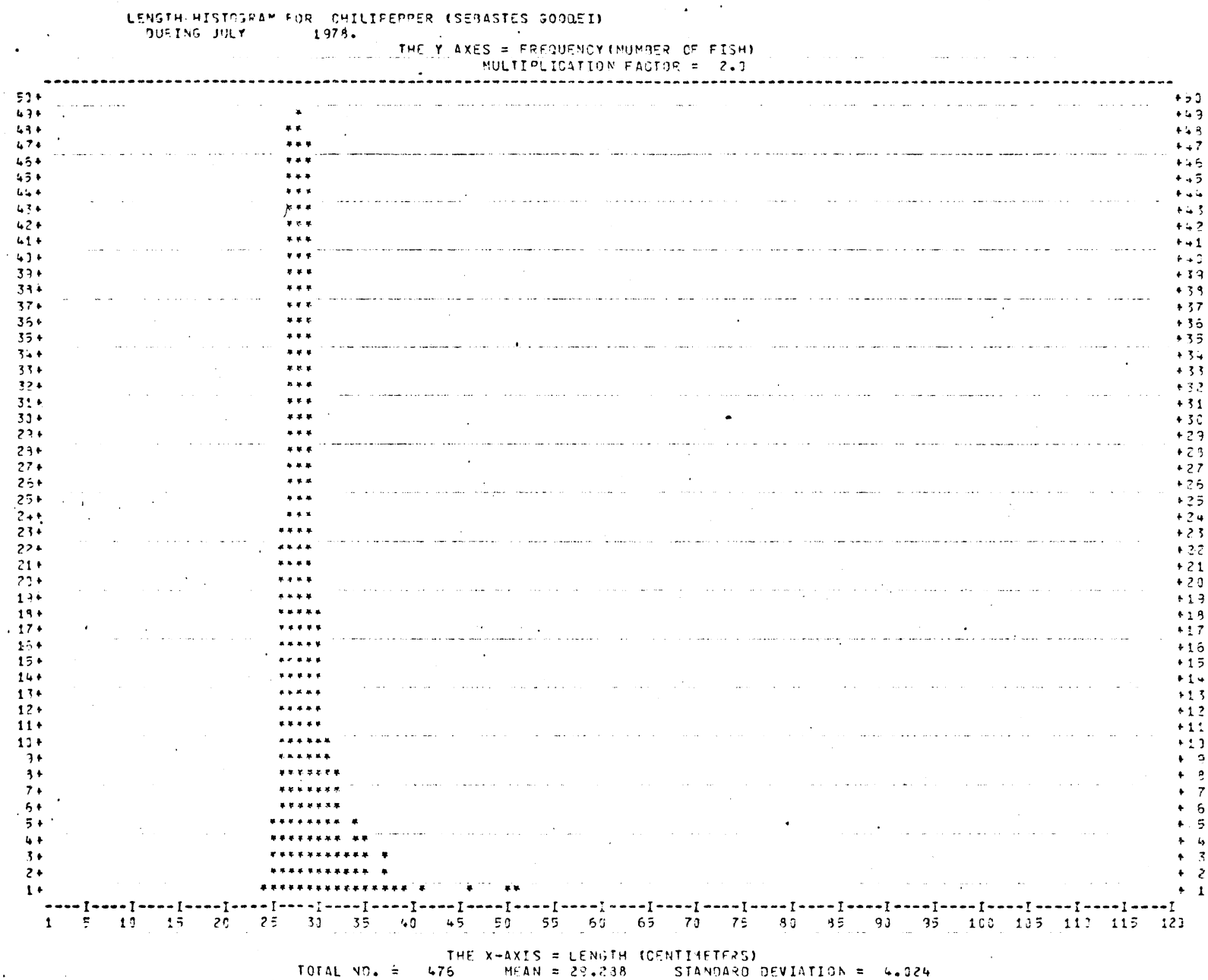


FIGURE 10. Length frequencies of chilipepper for July 1978.

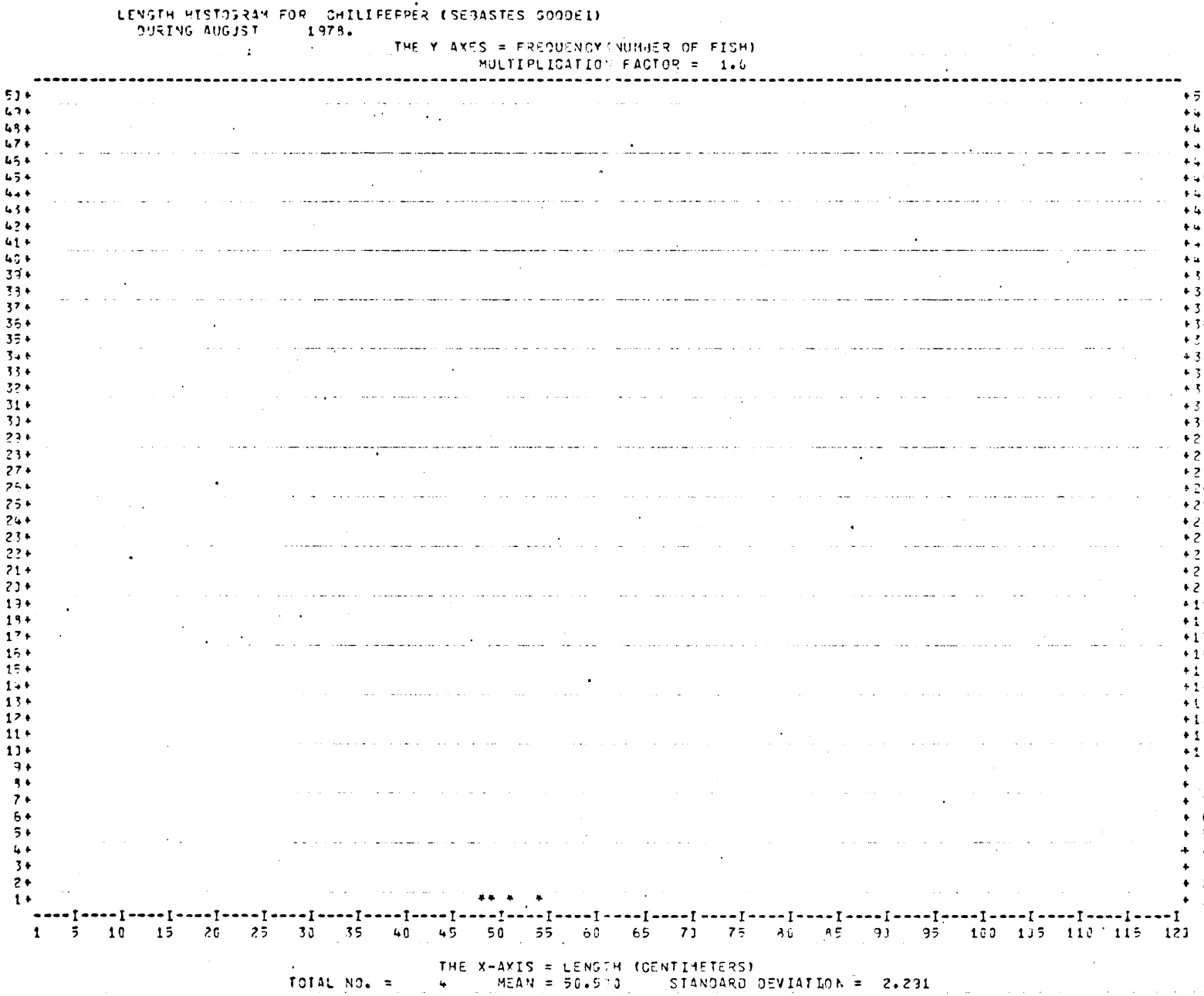


FIGURE 11. Length frequencies of chilipepper for August 1978.

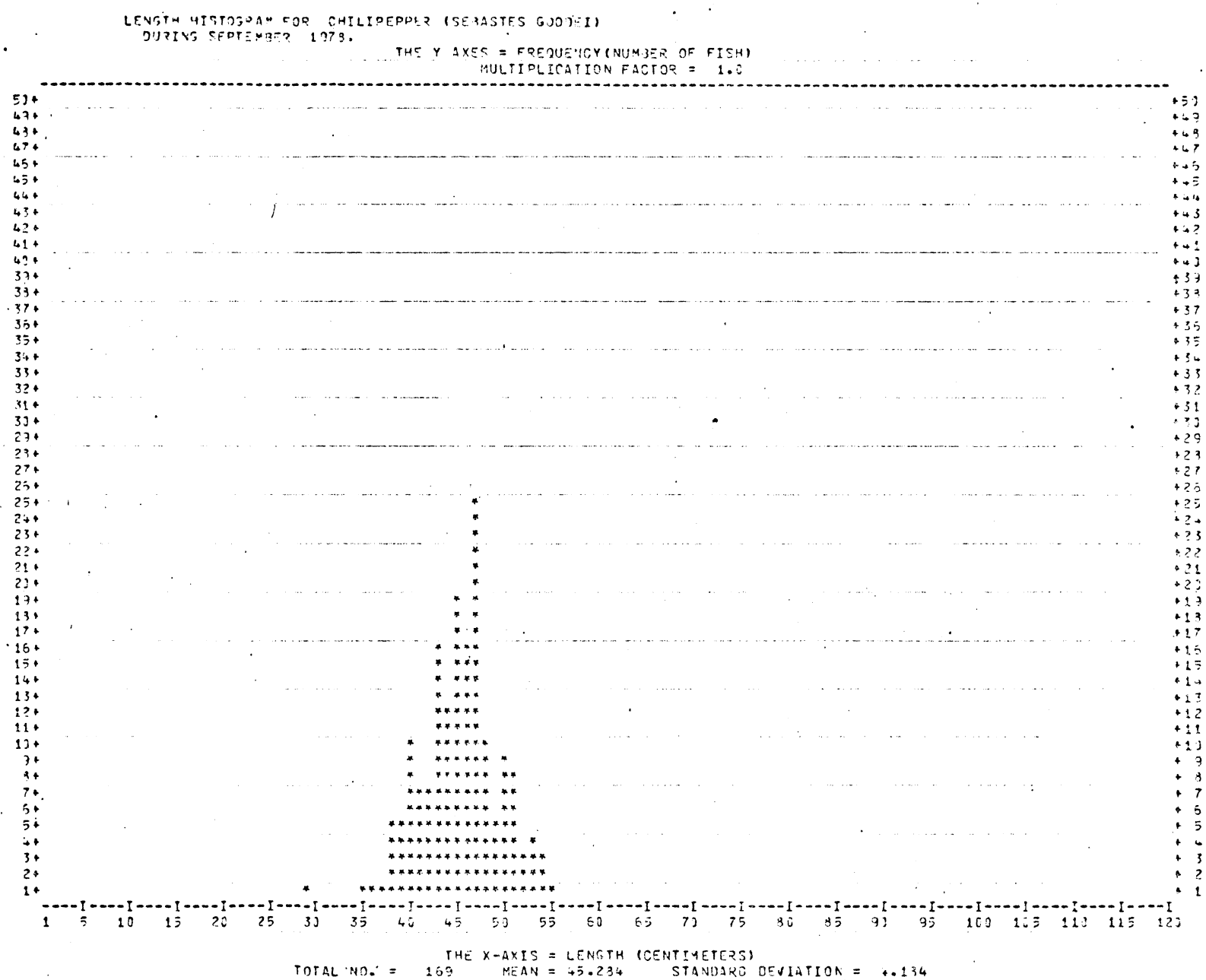


FIGURE 12. Length frequencies of chilipepper for September 1978.
Total No. Quarter 649 Mean Length Quarter 33.585 cm

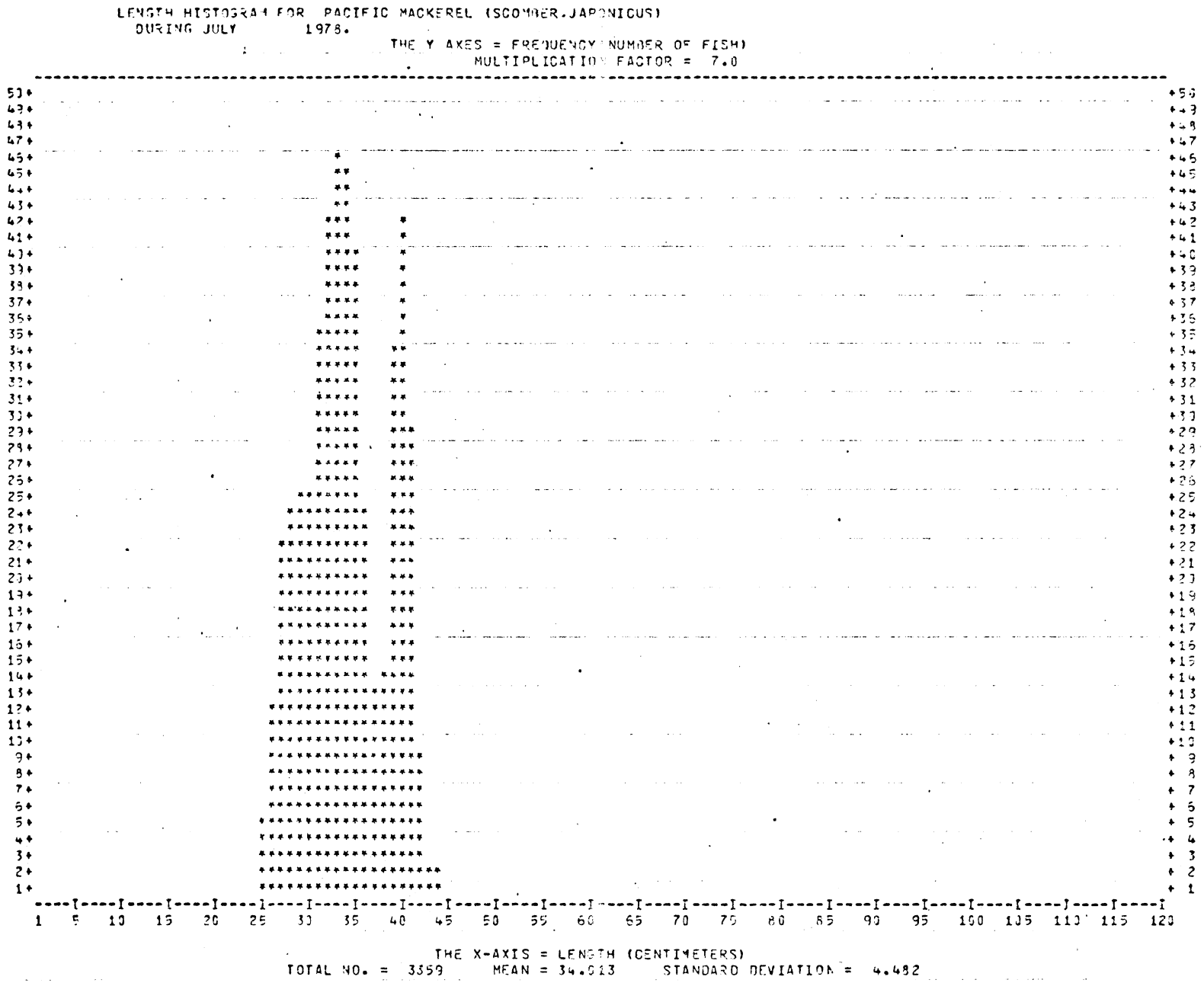


FIGURE 13. Length frequencies of Pacific mackerel for July 1978.

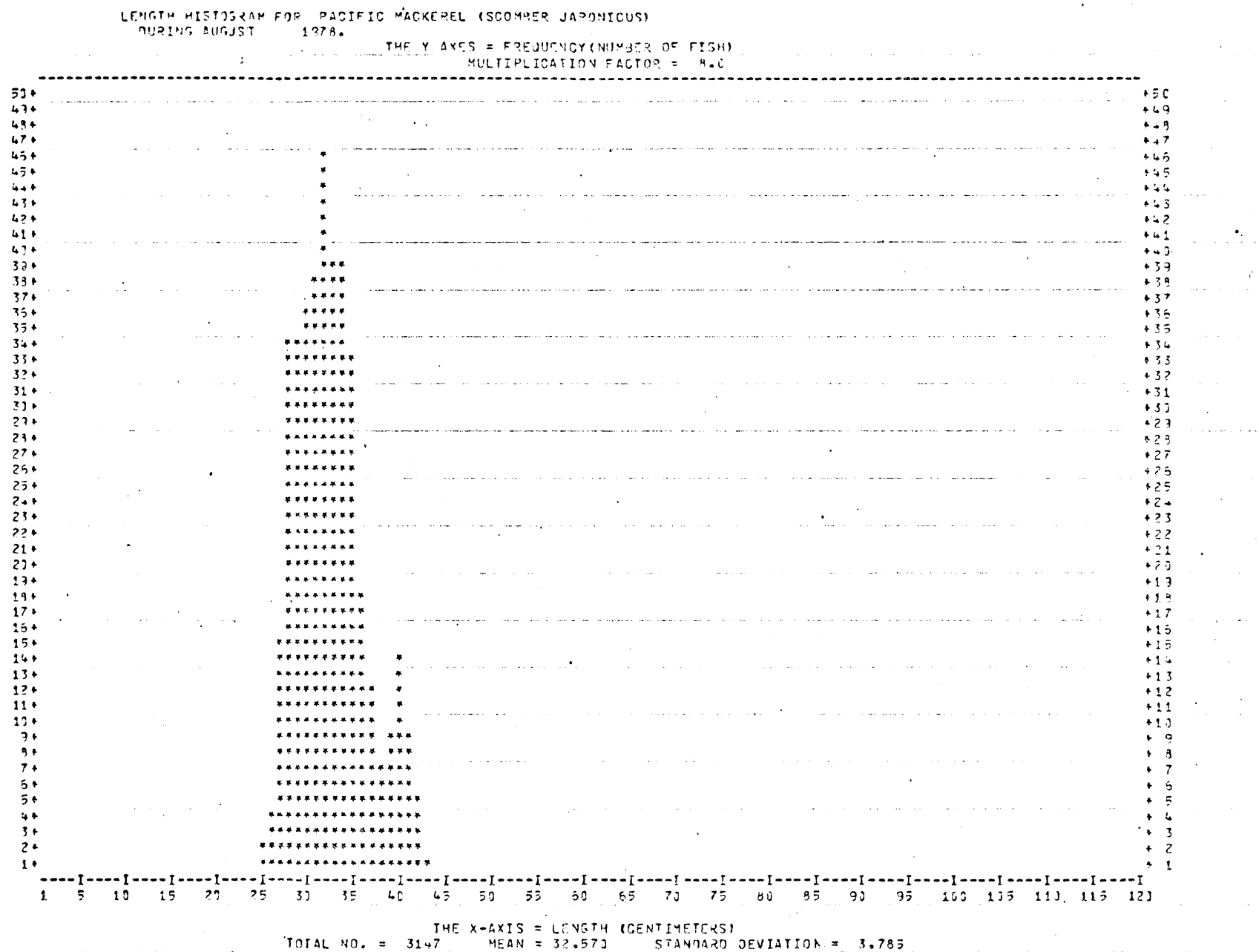


FIGURE 14. Length frequencies of Pacific mackerel for August 1978.

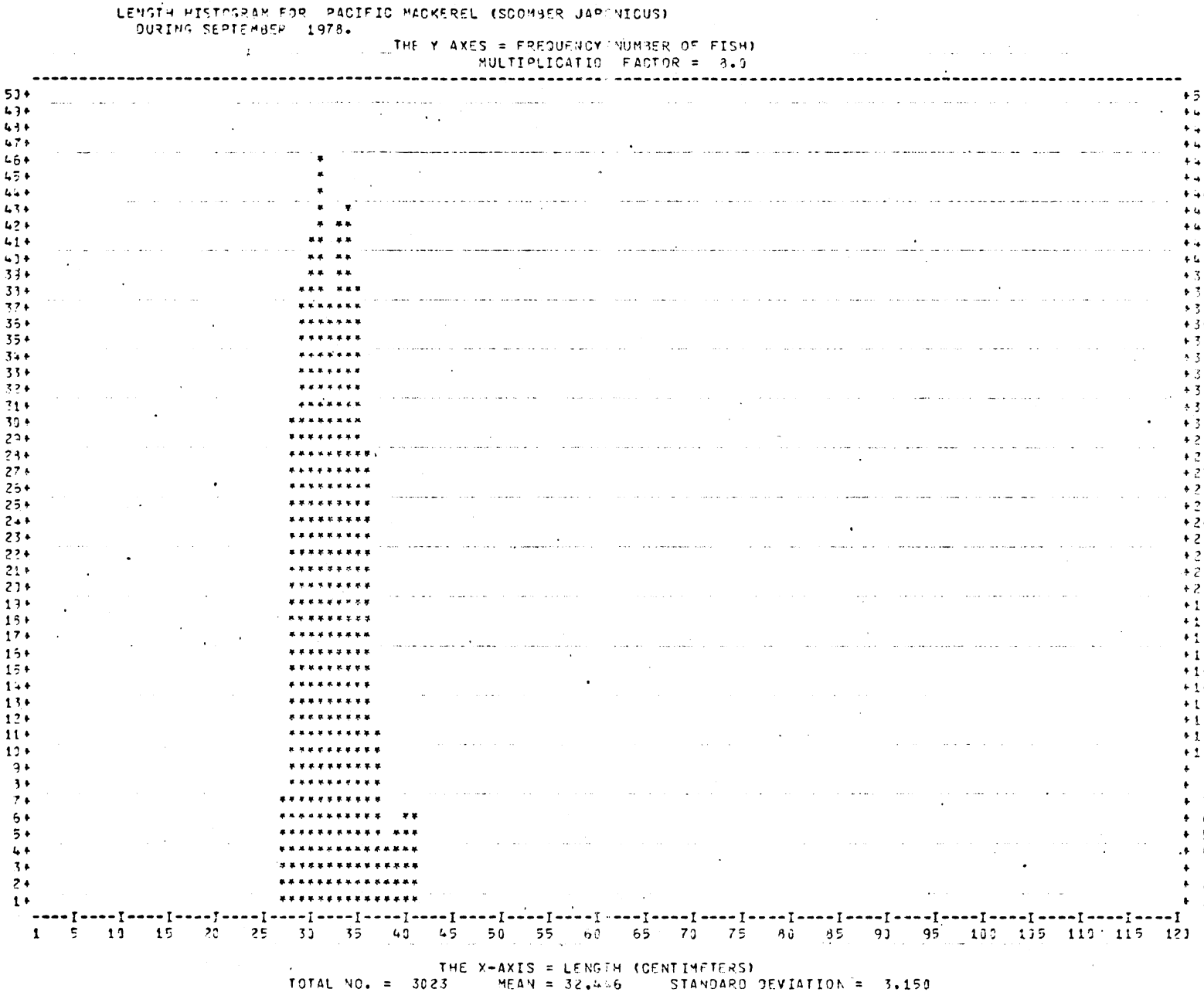


FIGURE 15. Length frequencies of Pacific mackerel for September 1978.
Total No. Quarter 9,529 Mean Length Quarter 33.040 cm

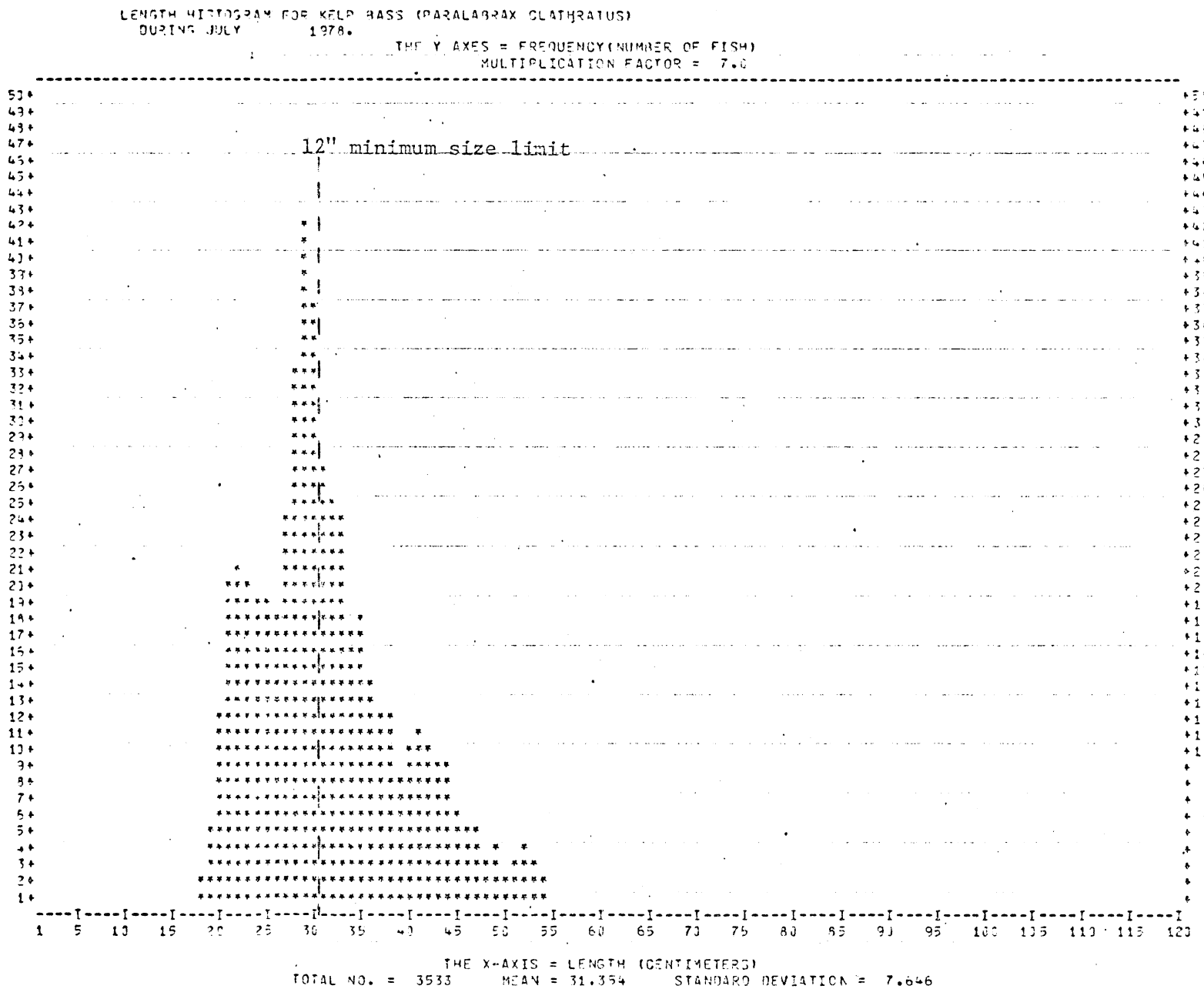


FIGURE 16. Length frequencies of kelp bass for July 1978.

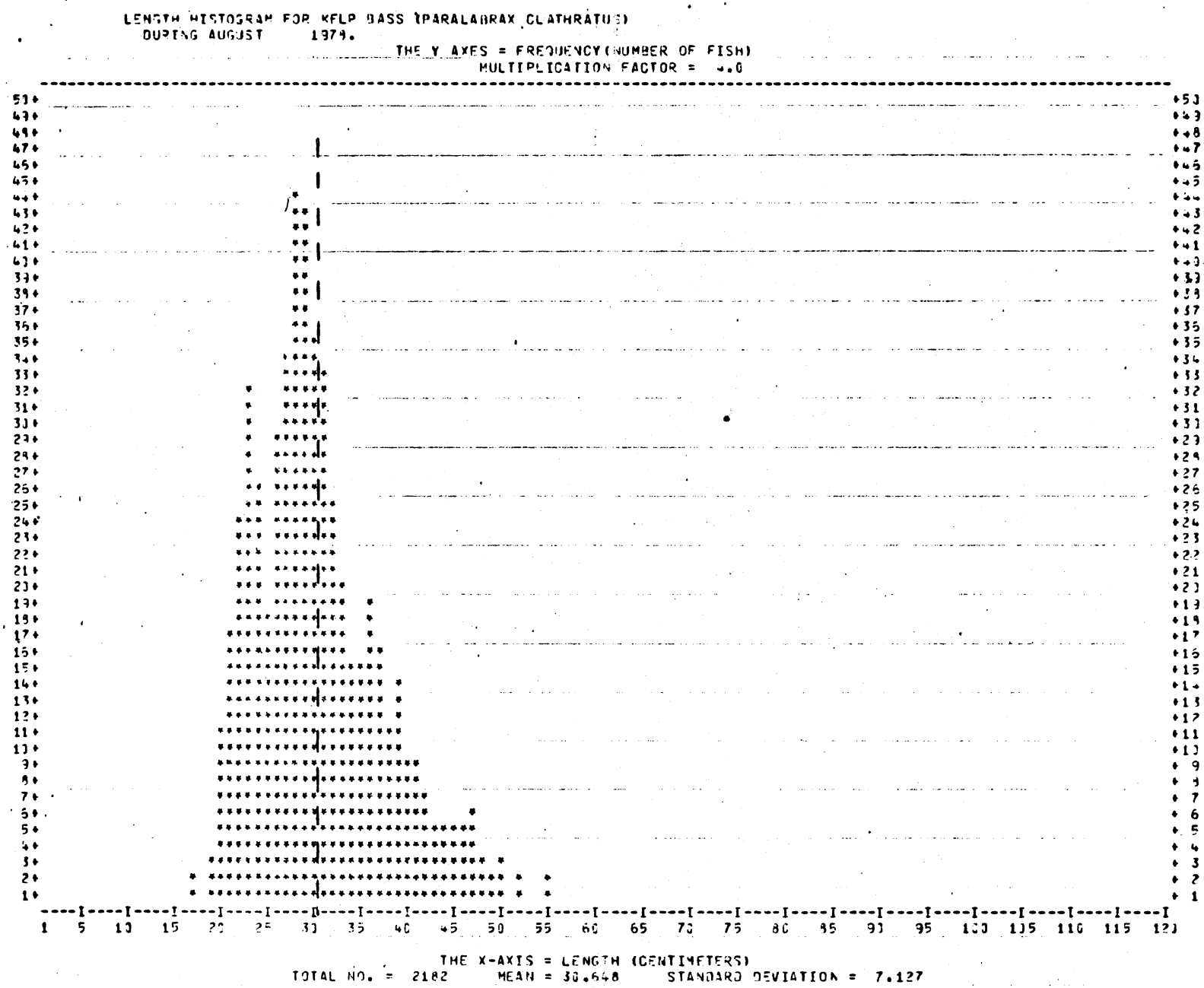


FIGURE 17. Length frequencies of kelp bass for August 1978.

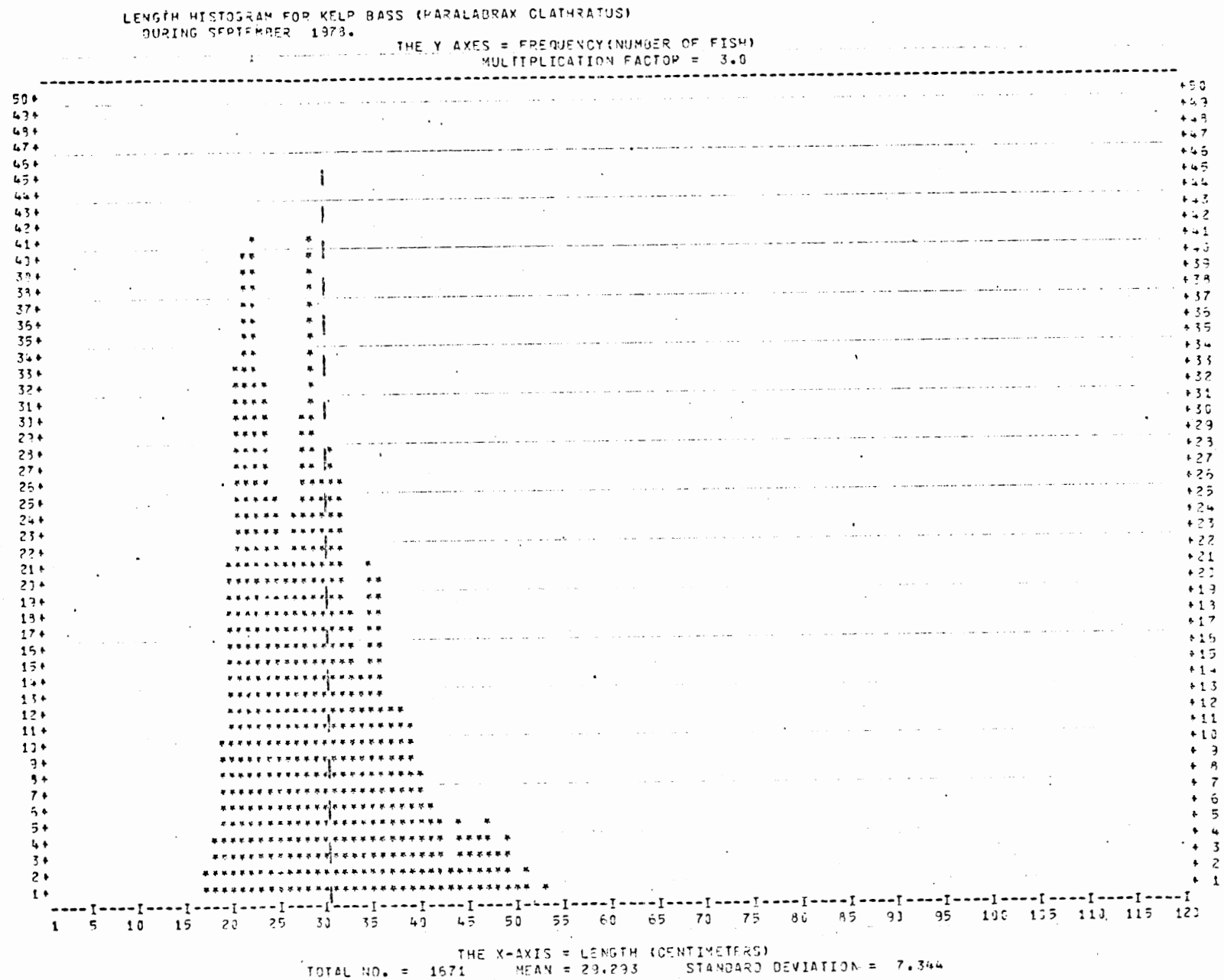


FIGURE 18. Length frequencies of kelp bass for September 1978.
Total No. Quarter 7,386 Mean Length Quarter 30.680 cm

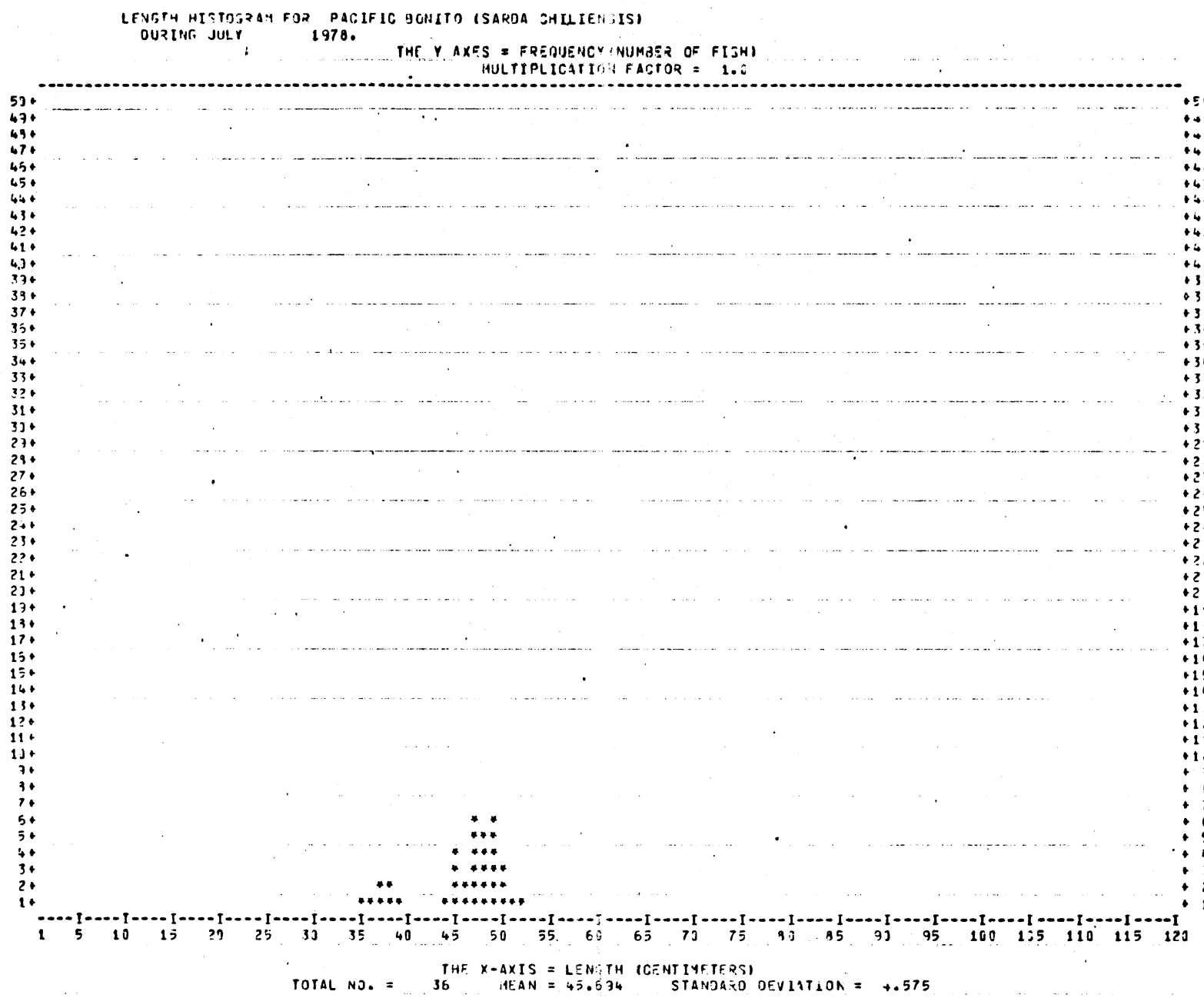


FIGURE 19. Length frequencies of Pacific bonito for July 1978.

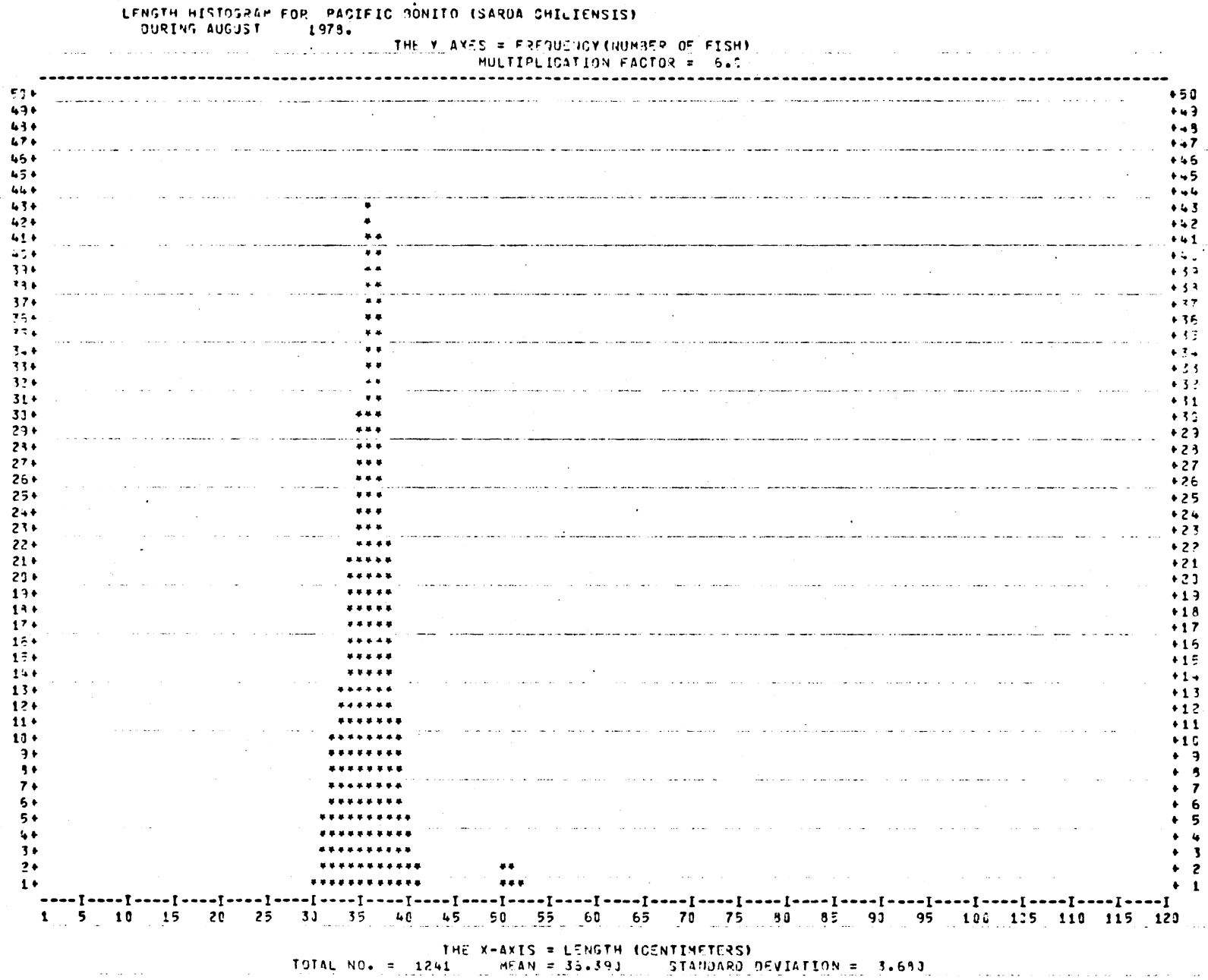


FIGURE 20. Length frequencies of Pacific bonito for August 1978.

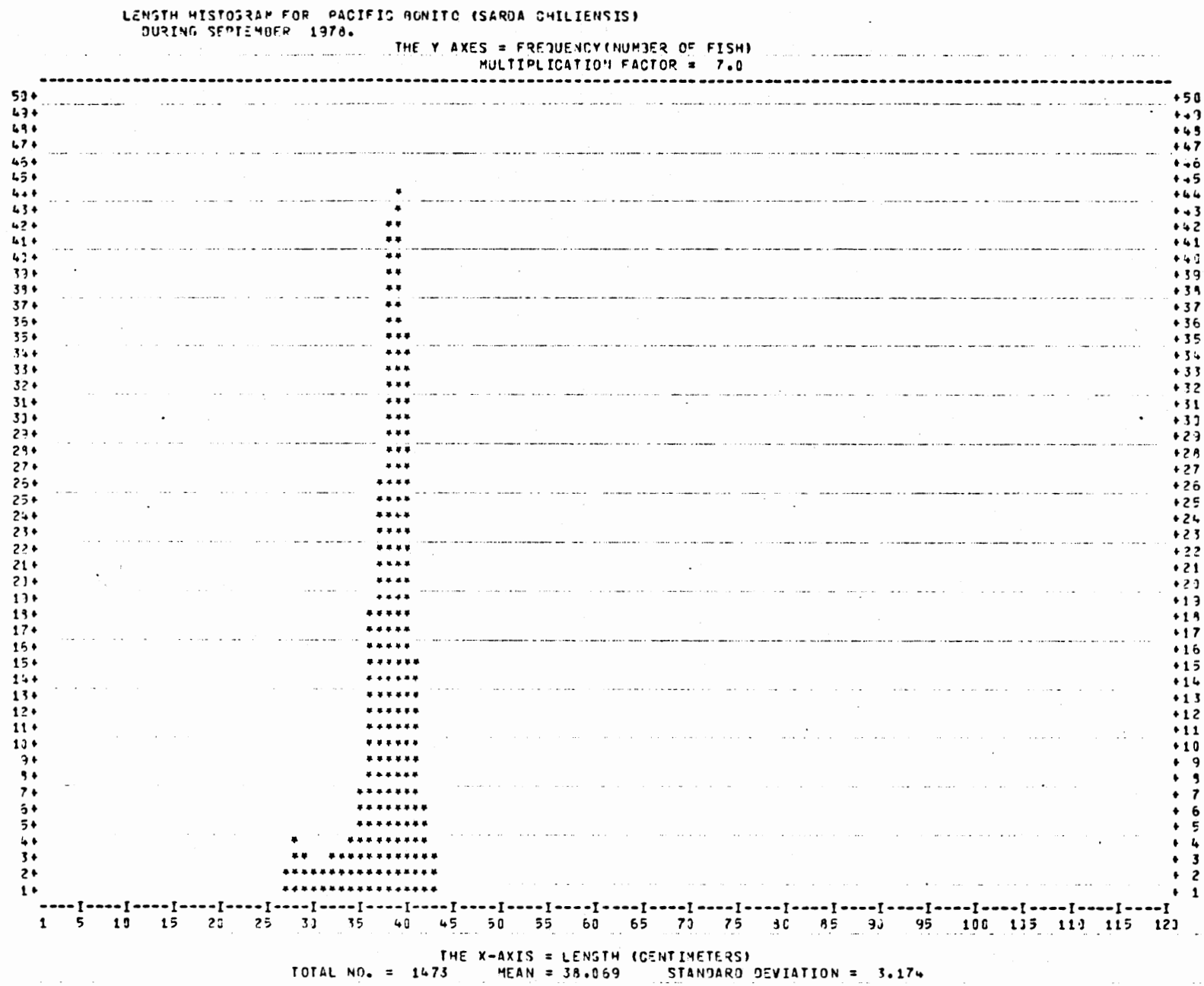


FIGURE 21. Length frequencies of Pacific bonito for September 1978.
Total No. Quarter 2,750 Mean Length Quarter 37.412 cm

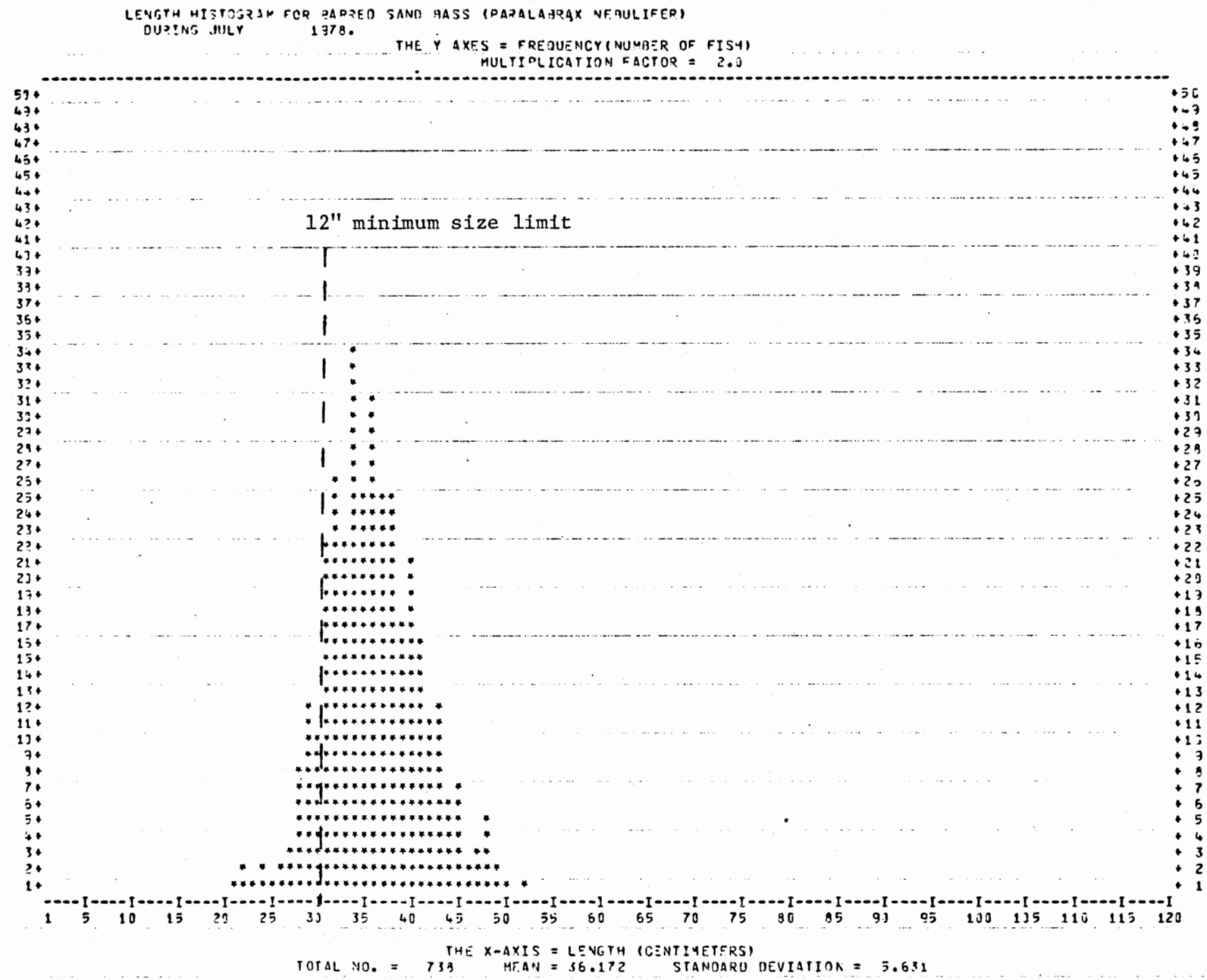


FIGURE 22. Length frequencies of barred sand bass for July 1978.

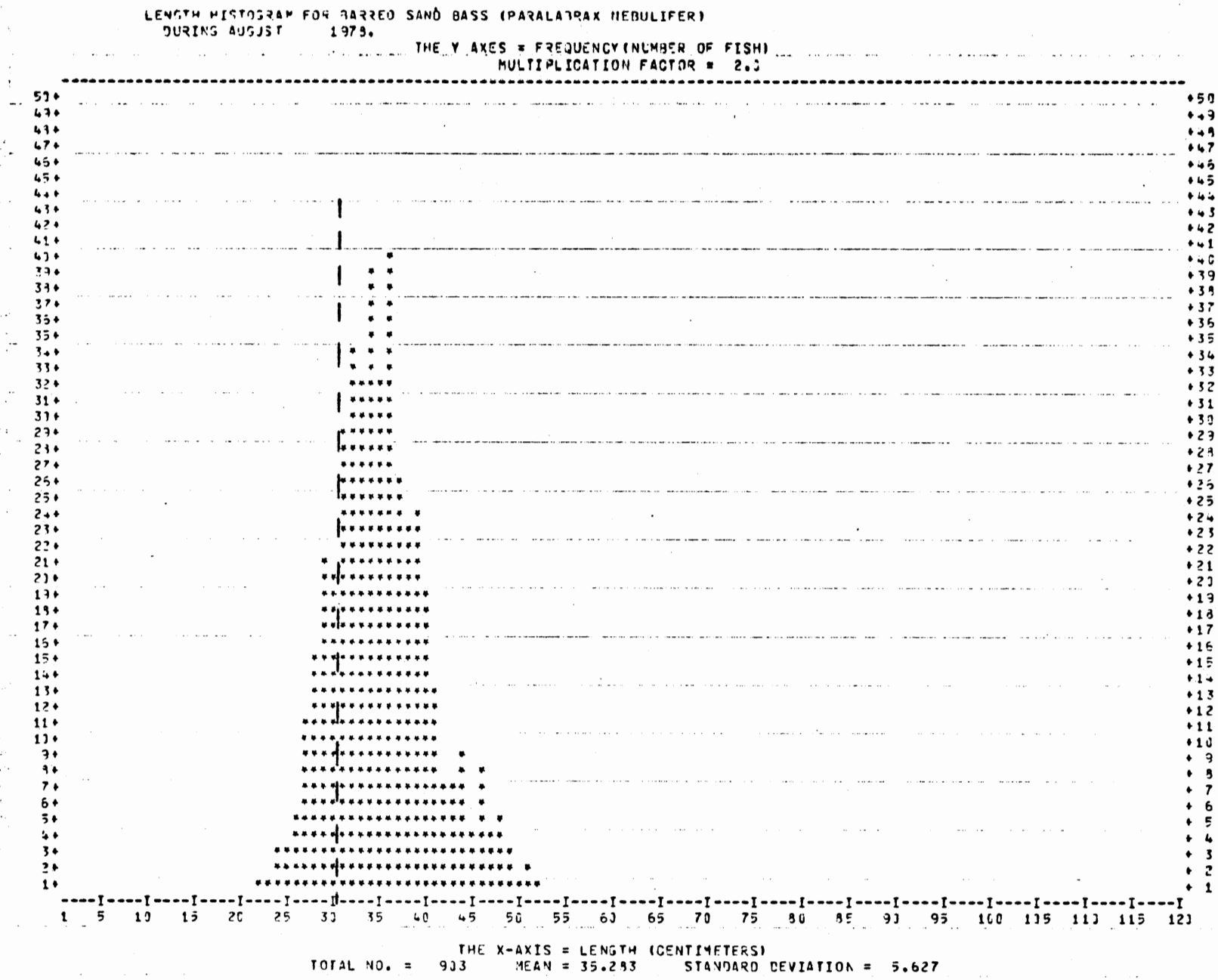


FIGURE 23. Length frequencies of barred sand bass for August 1978.

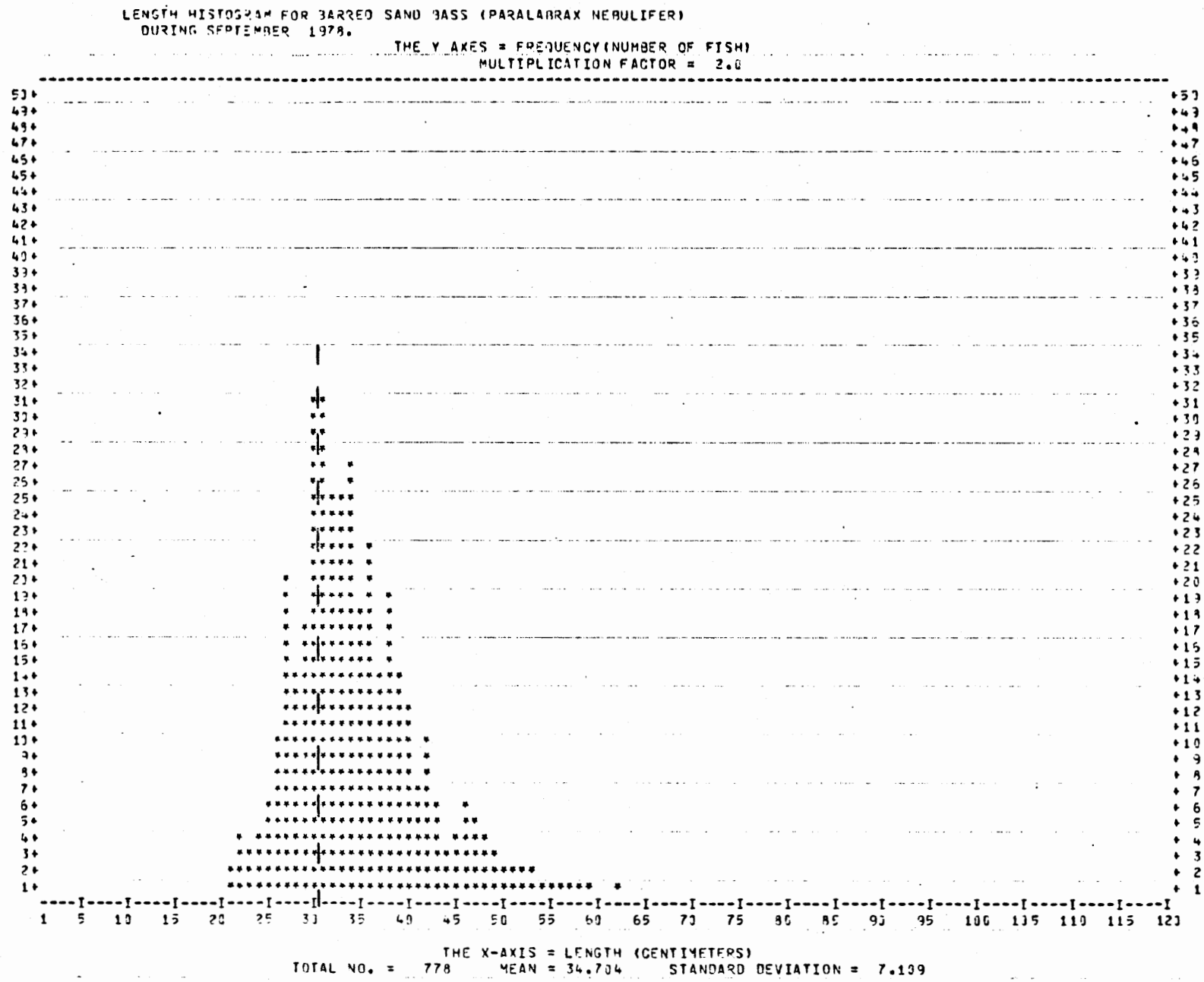


FIGURE 24. Length frequencies of barred sand bass for September 1978.
Total No. Quarter 2,416 Mean Length Quarter 35.368 cm

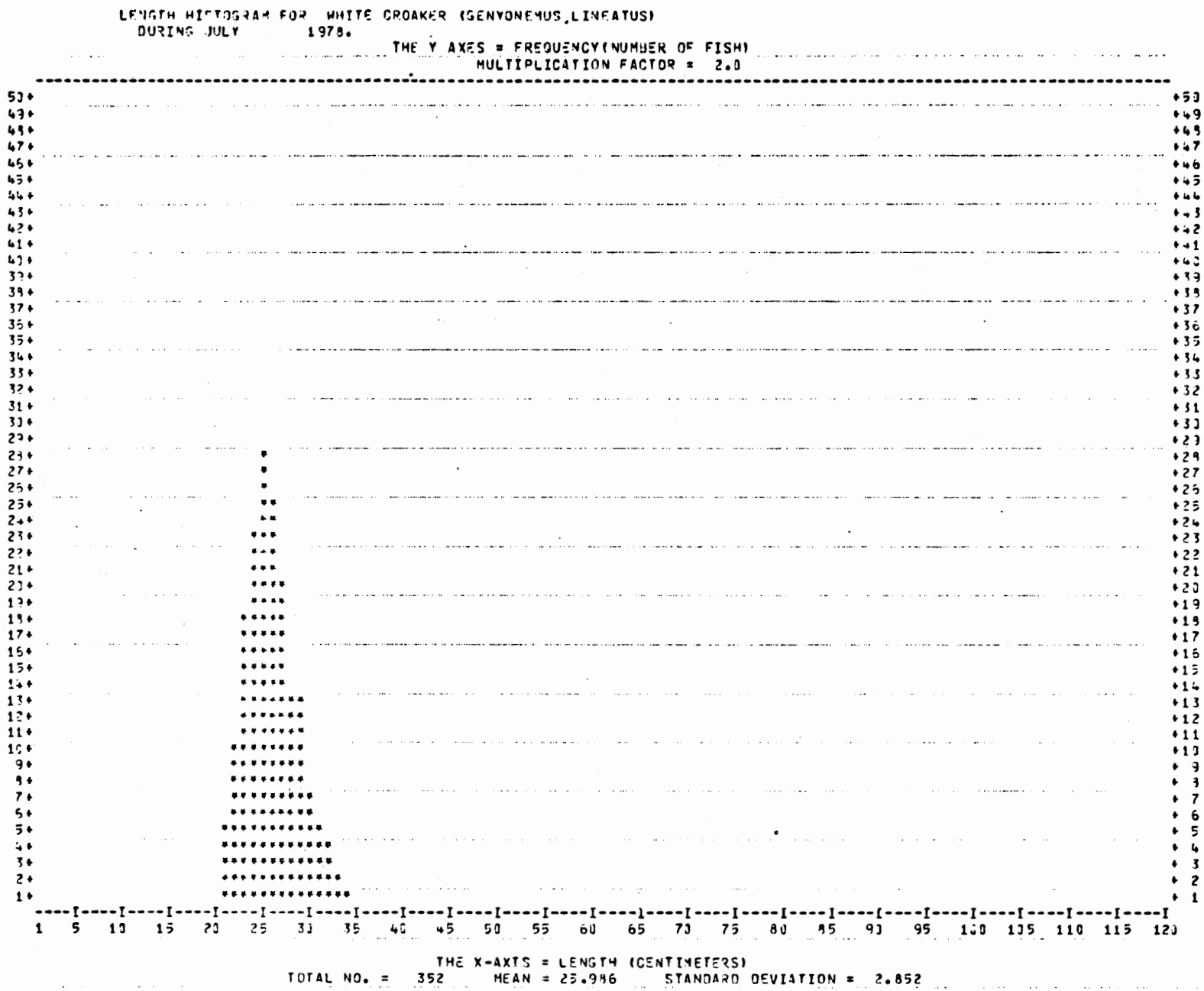


FIGURE 25. Length frequencies of white croaker for July 1978.

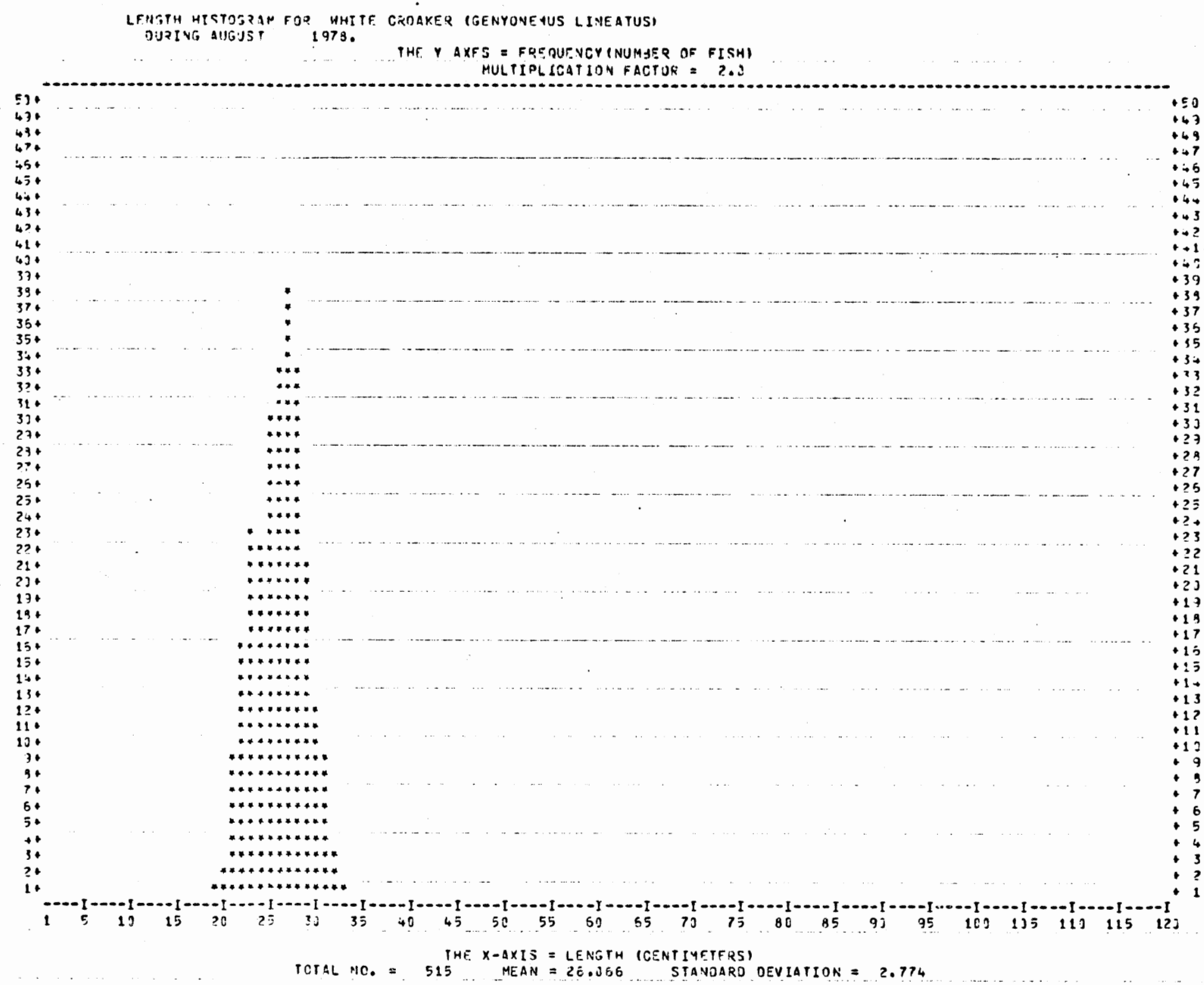


FIGURE 26. Length frequencies of white croaker for August 1978.

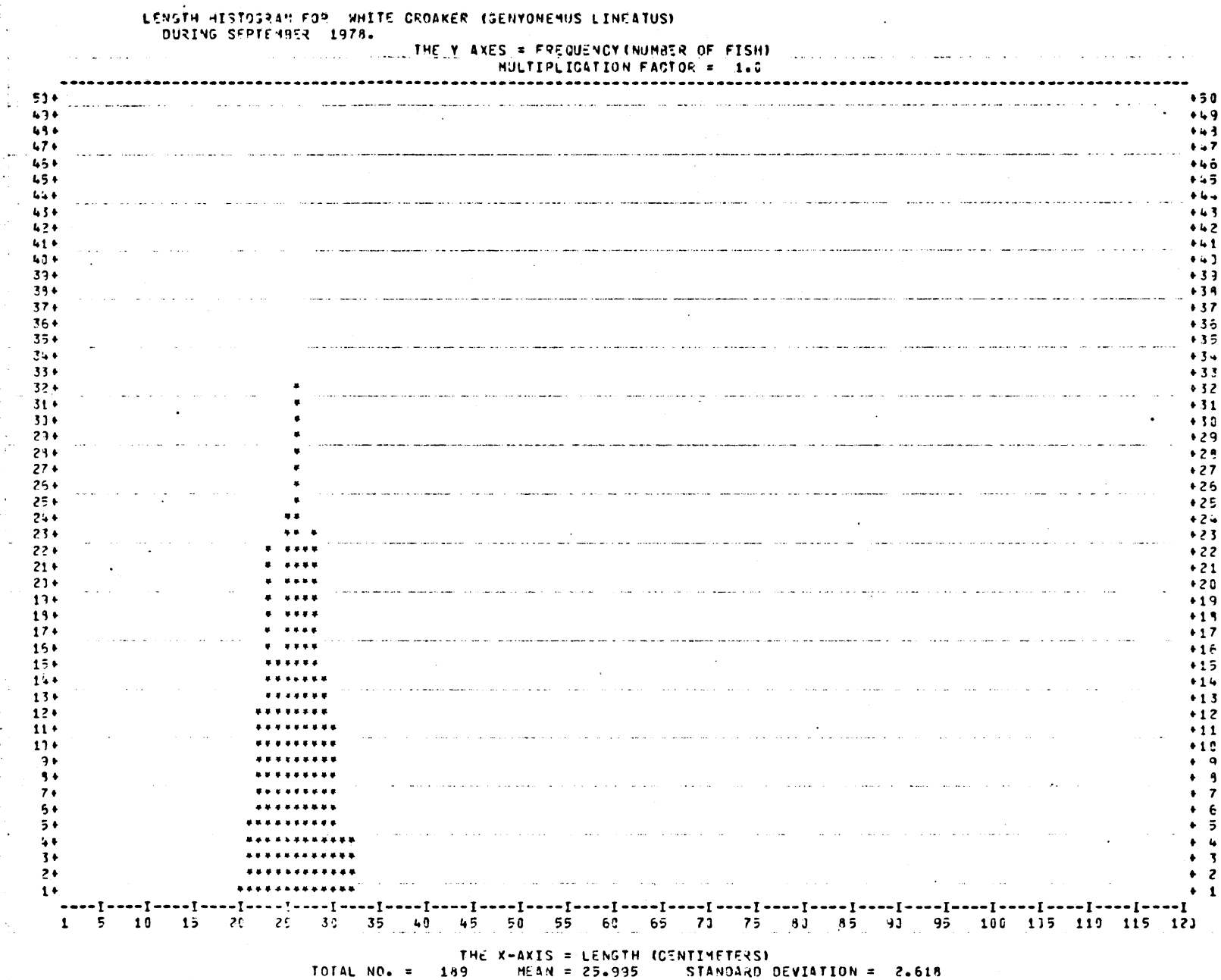


FIGURE 27. Length frequencies of white croaker for September 1978.
Total No. Quarter 1,056 Mean Length Quarter 26.027 cm

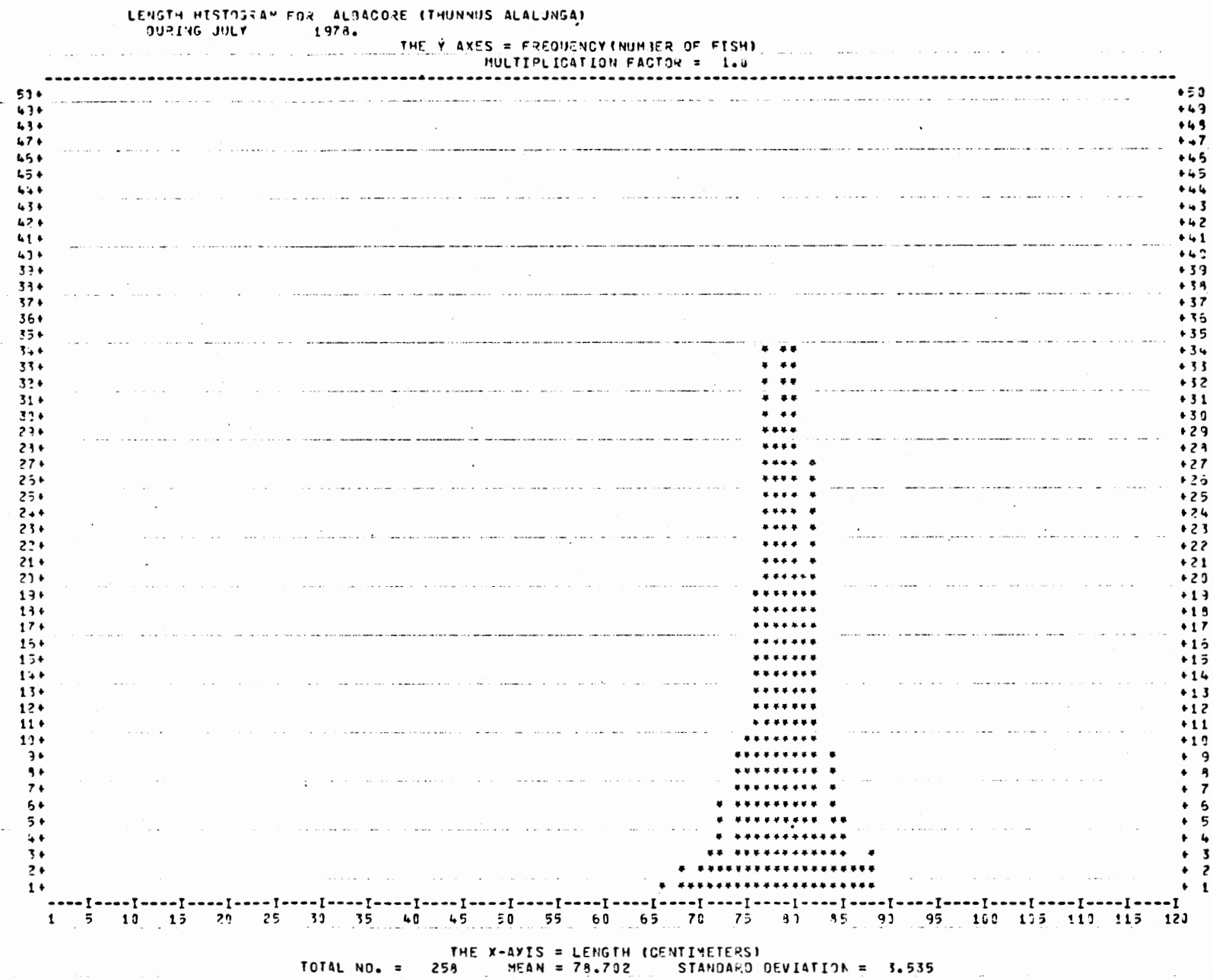


FIGURE 28. Length frequencies of albacore for July 1978.

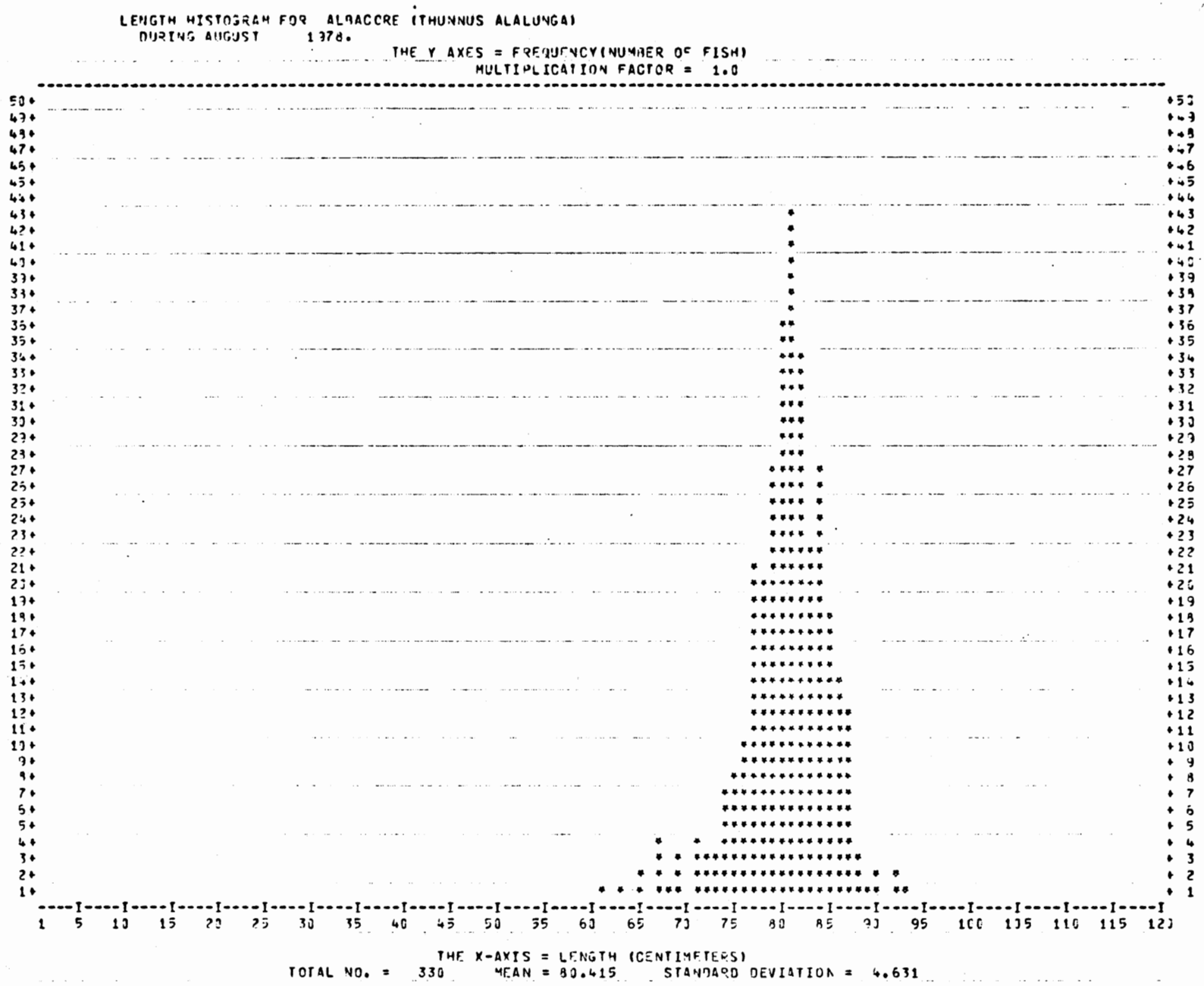


FIGURE 29. Length frequencies of albacore for August 1978.

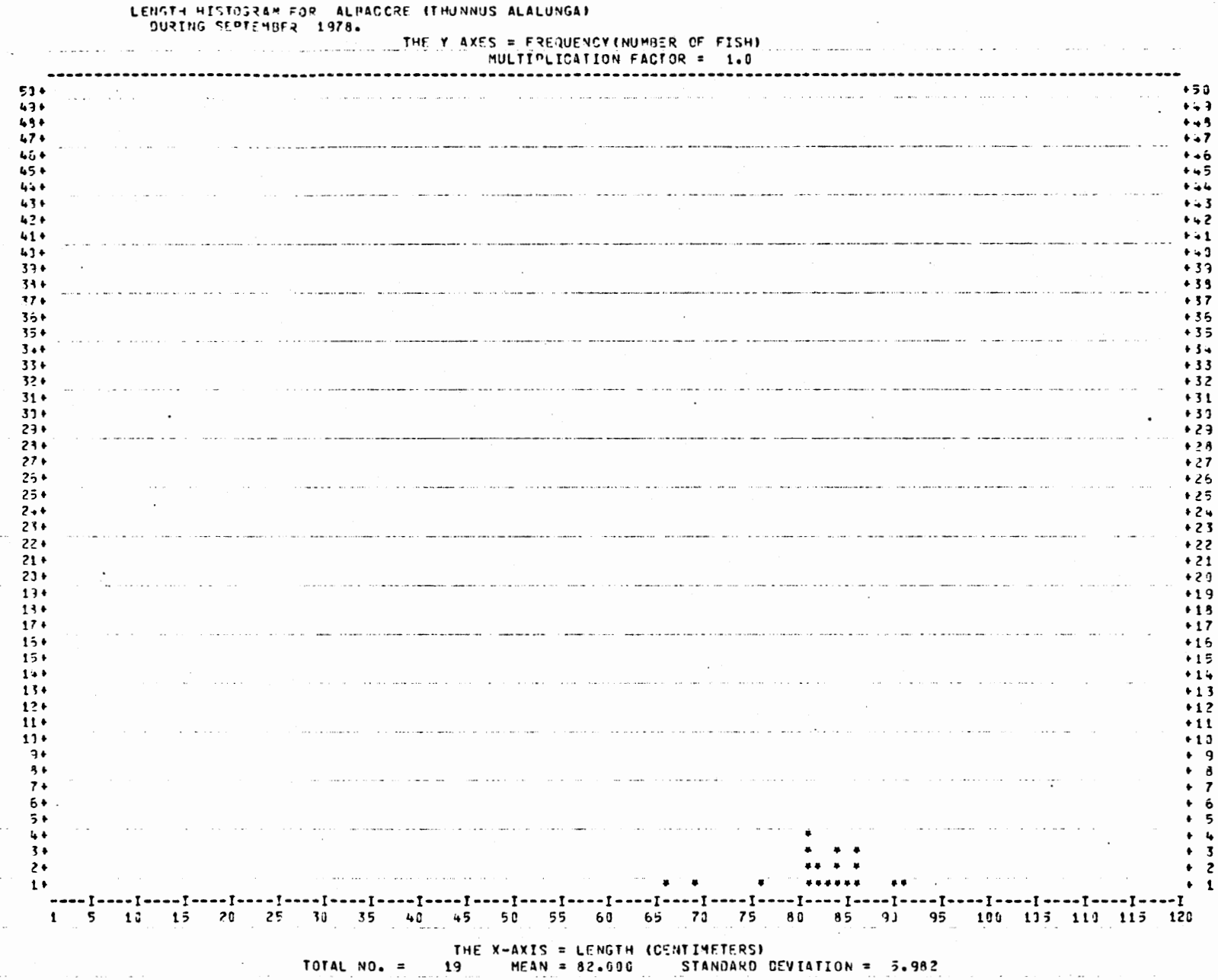


FIGURE 30. Length frequencies of albacore for September 1978.
Total No. Quarter 607 Mean Length Quarter 79.737

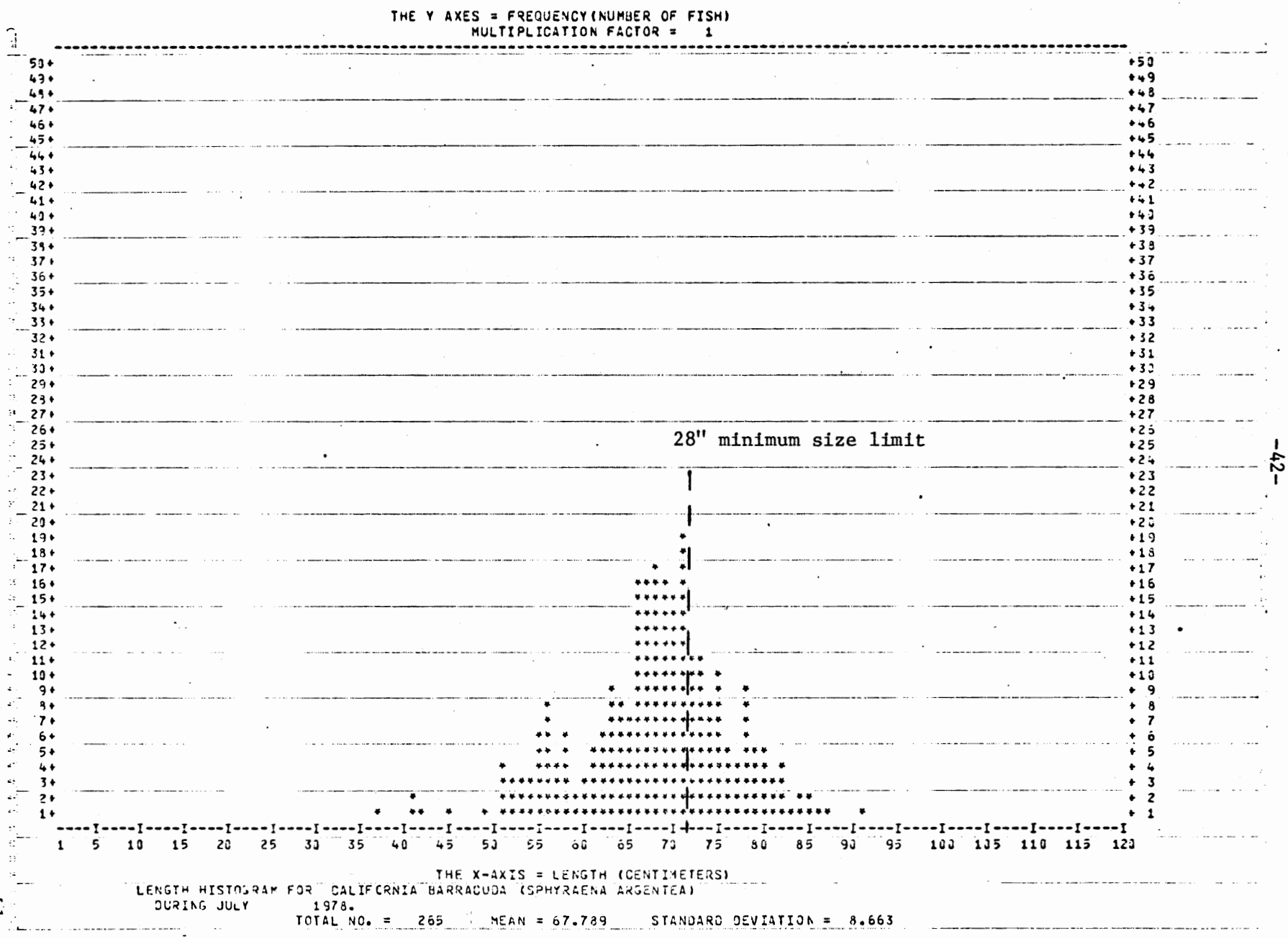


FIGURE 31. Length frequencies of California barracuda for July 1978.

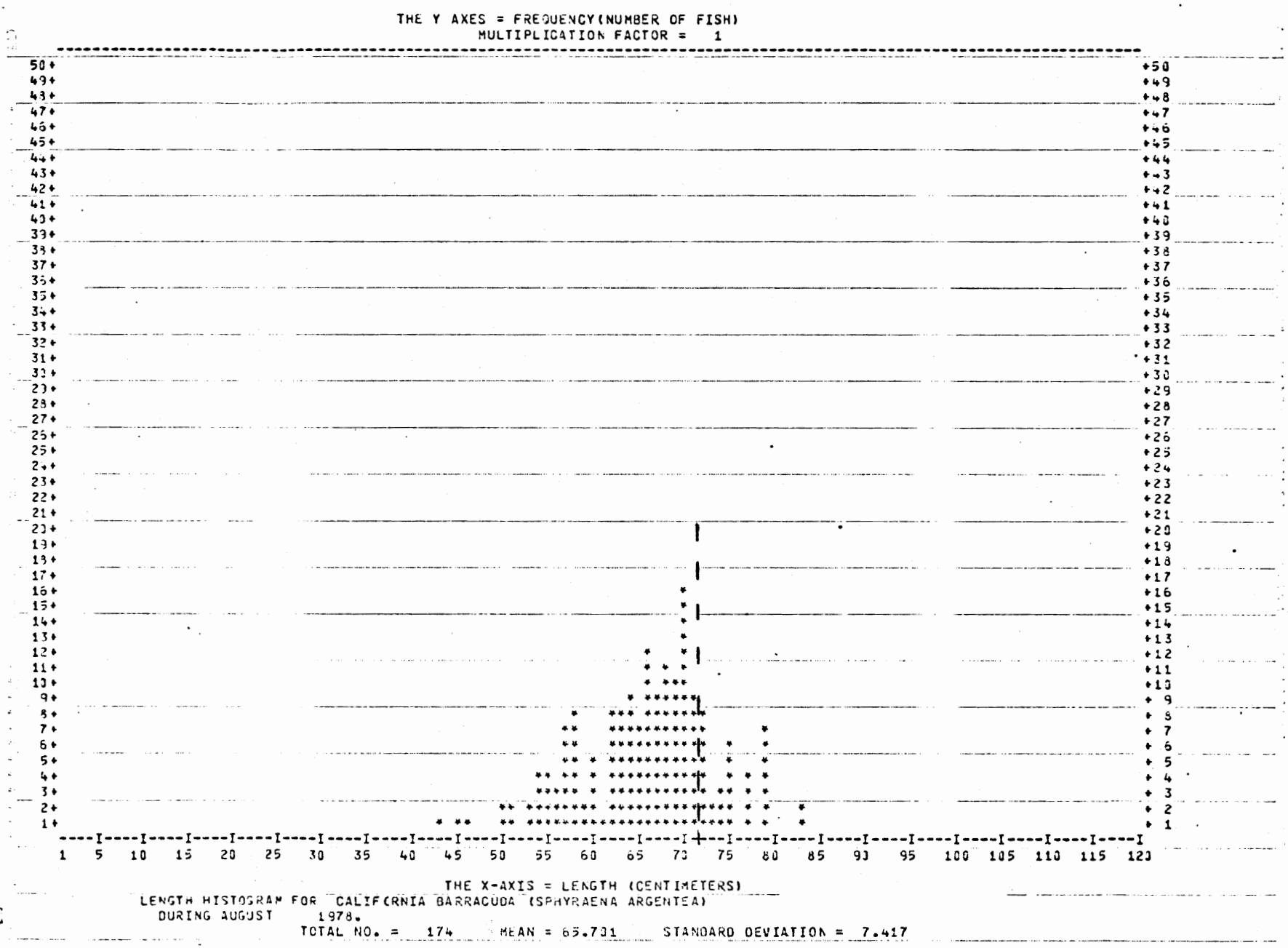


FIGURE 32. Length frequencies of California barracuda for August 1978.

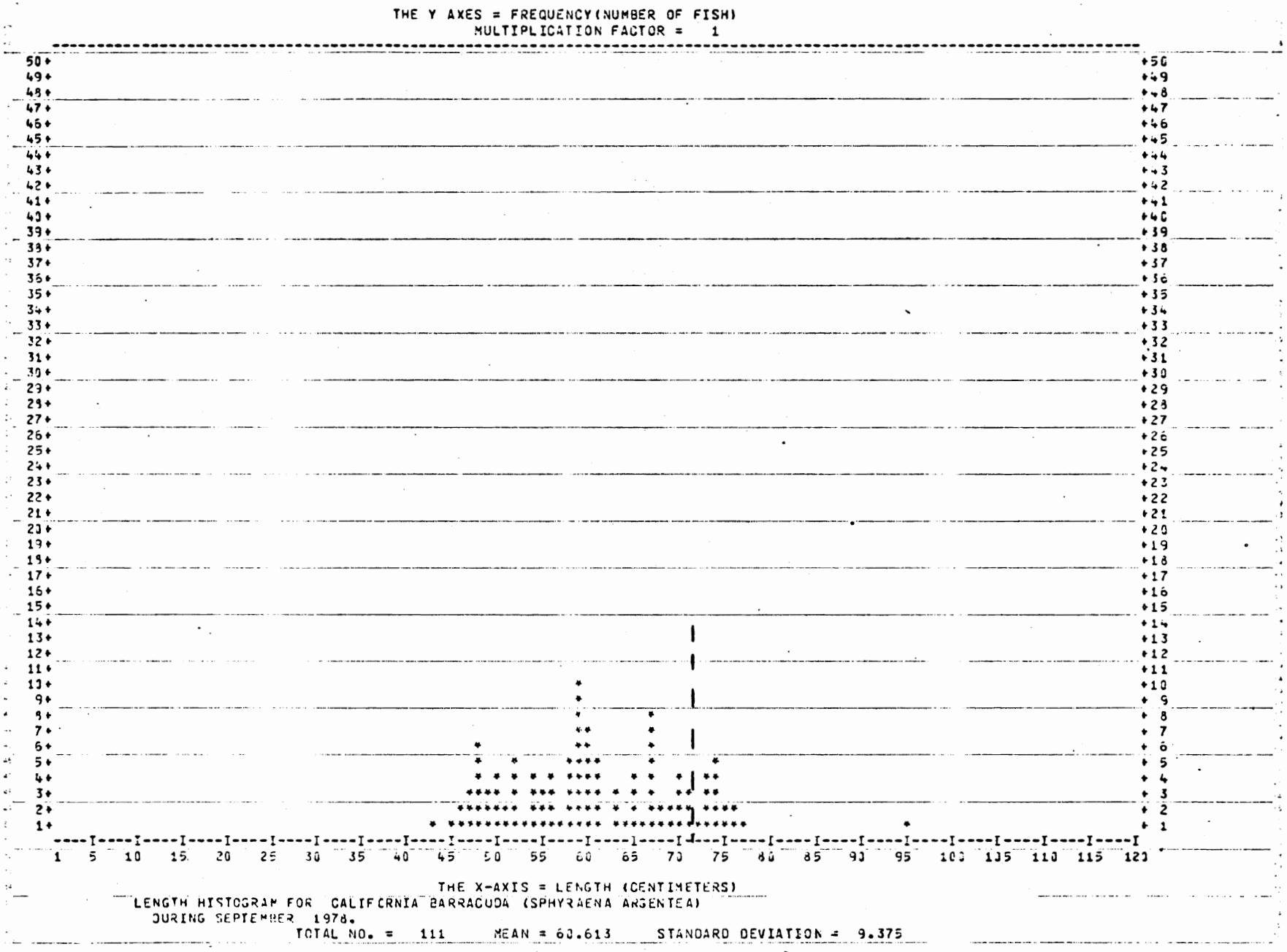
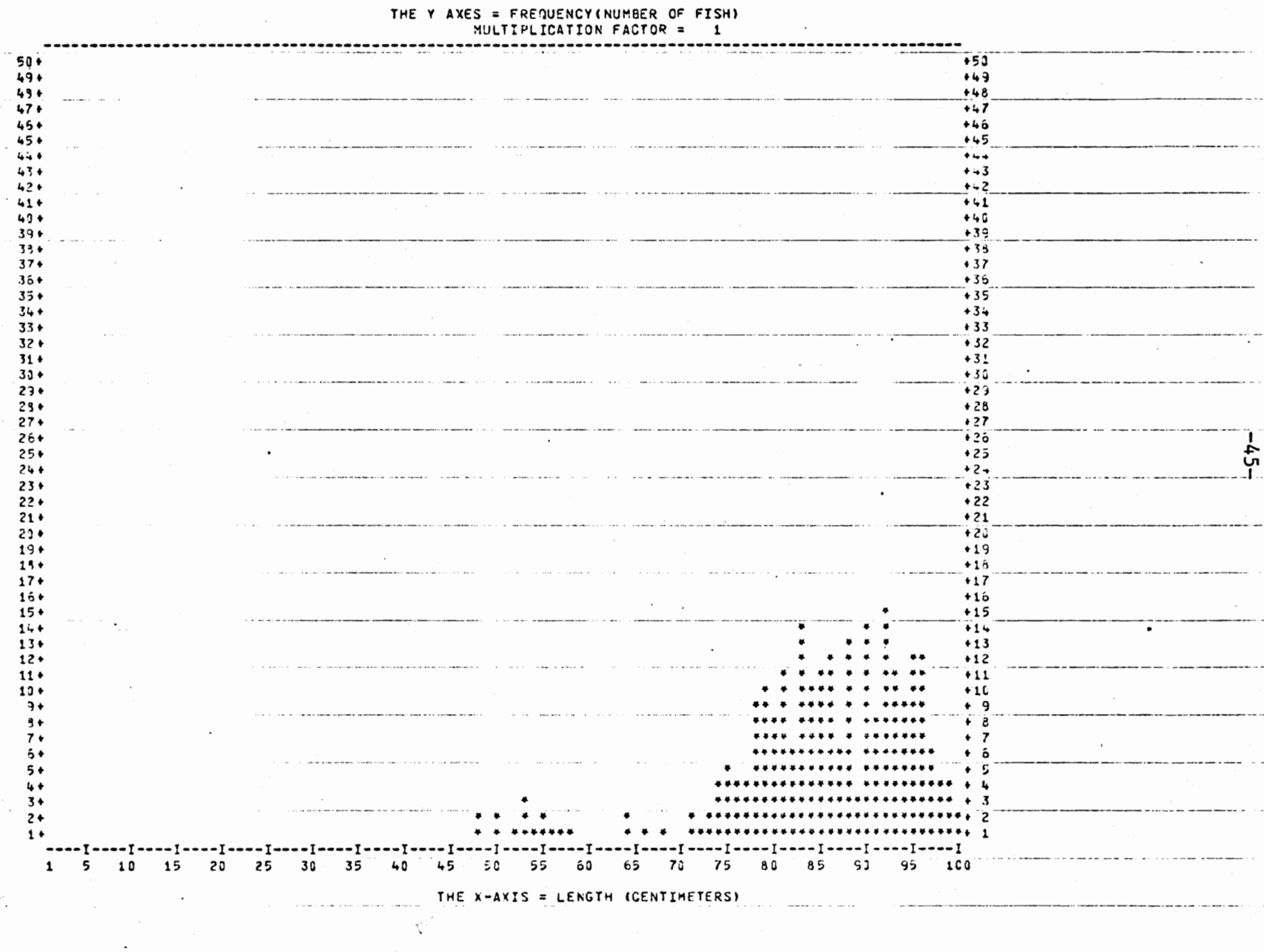


FIGURE 33. Length frequencies of California barracuda for September 1978.
Total No. Quarter 500 Mean Length Quarter 65.691 cm


THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1
50+ +50
49+ +49
48+ +48
47+ +47
46+ +46
45+ +45
44+ +44
43+ +43
42+ +42
41+ +41
40+ +40
39+ +39
38+ +38
37+ +37
36+ +36
35+ +35
34+ +34
33+ +33
32+ +32
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29+ +29
28+ +28
27+ +27
26+ +26
25+ +25
24+ +24
23+ +23
22+ +22
21+ +21
20+ +20
19+ +19
18+ +18
17+ +17
16+ +16
15+ +15
14+ +14
13+ +13
12+ +12
11+ +11
10+ +10
9+ + 9
8+ + 8
7+ + 7
6+ + 6
5+ + 5
4+ + 4
3+ + 3
2+ + 2
1+ + 1
1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
THE X-AXIS = LENGTH (CENTIMETERS)

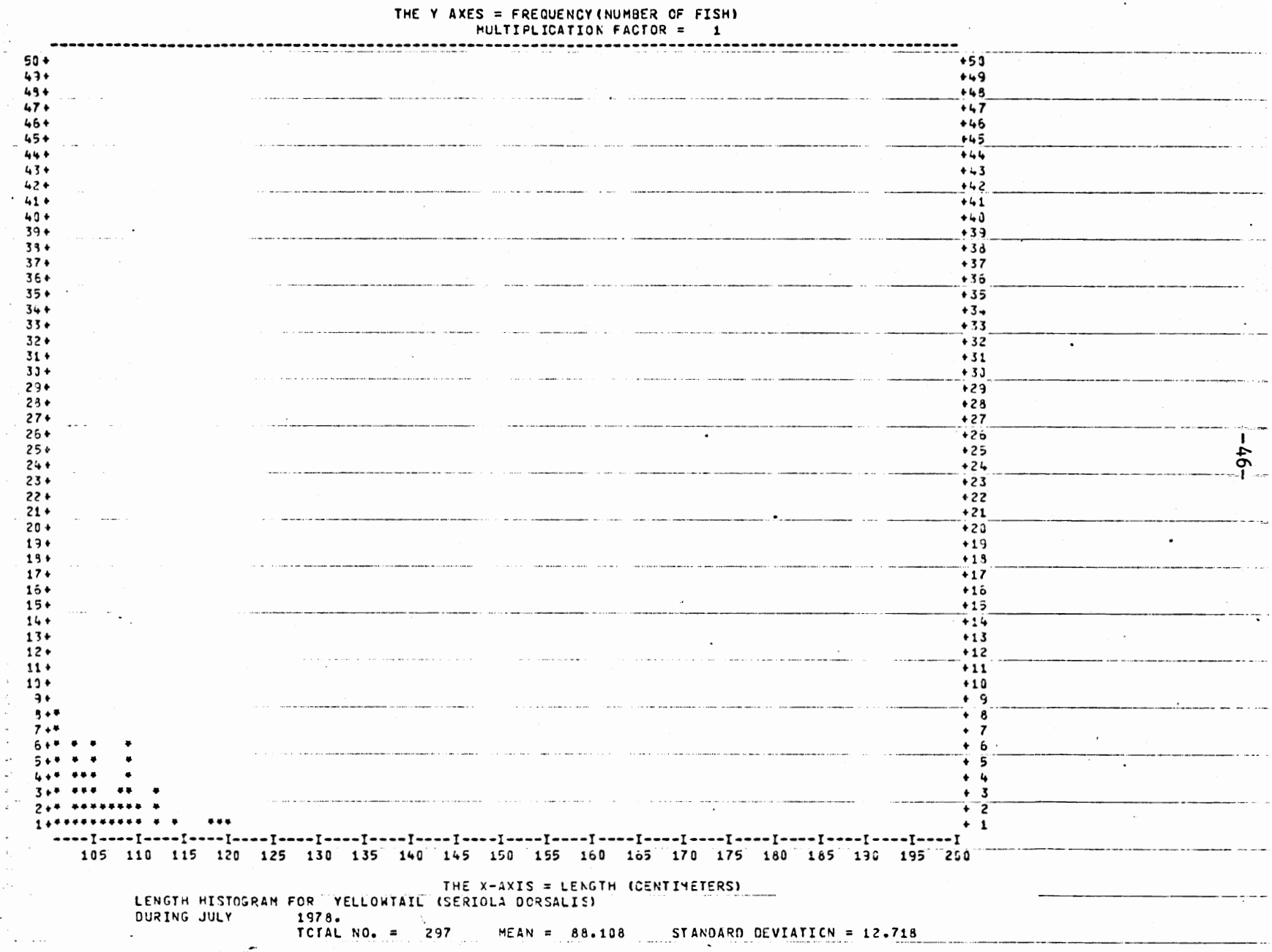
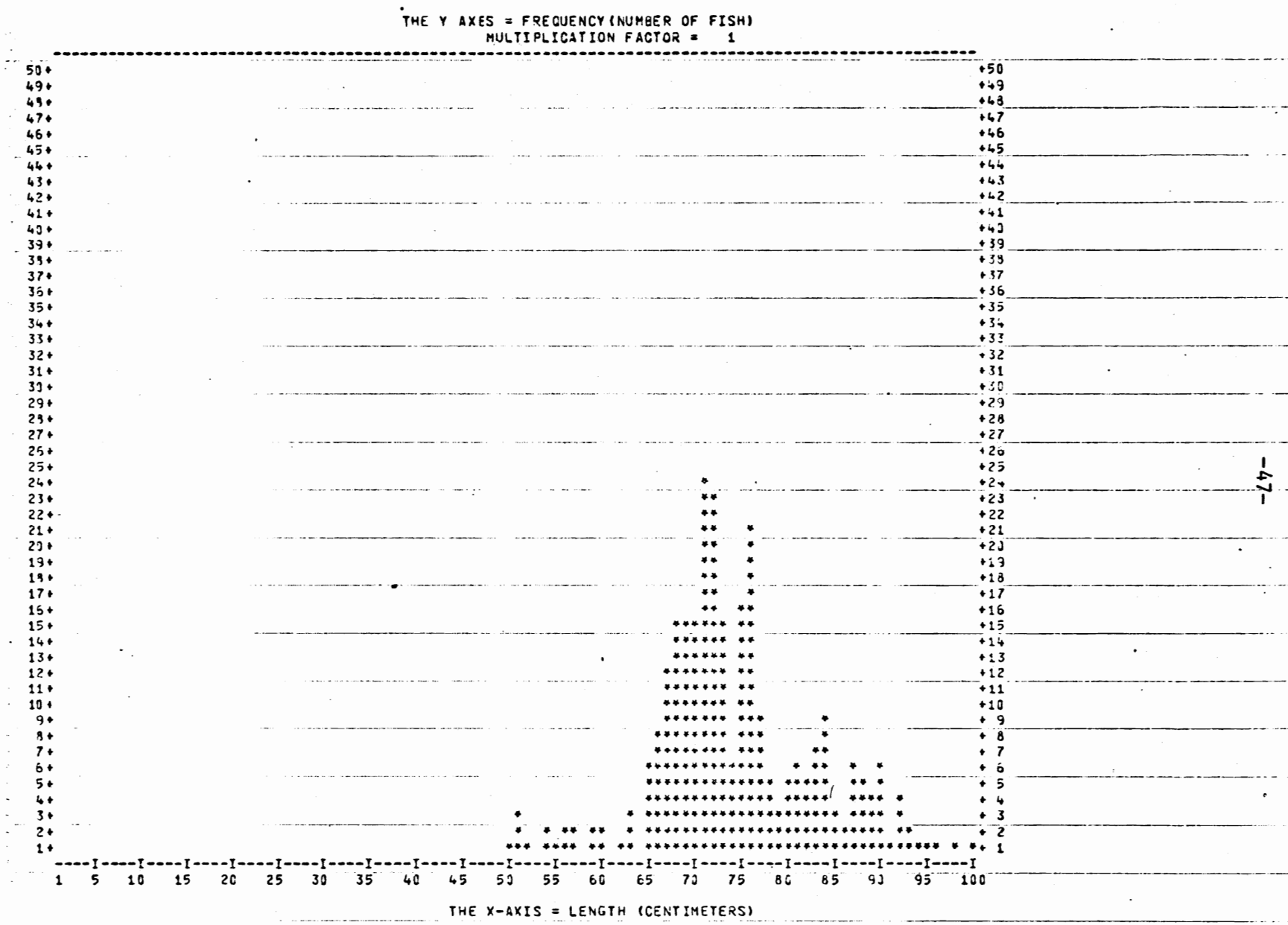


FIGURE 34. Length frequencies of yellowtail for July 1978.


THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1
THE X-AXIS = LENGTH (CENTIMETERS)

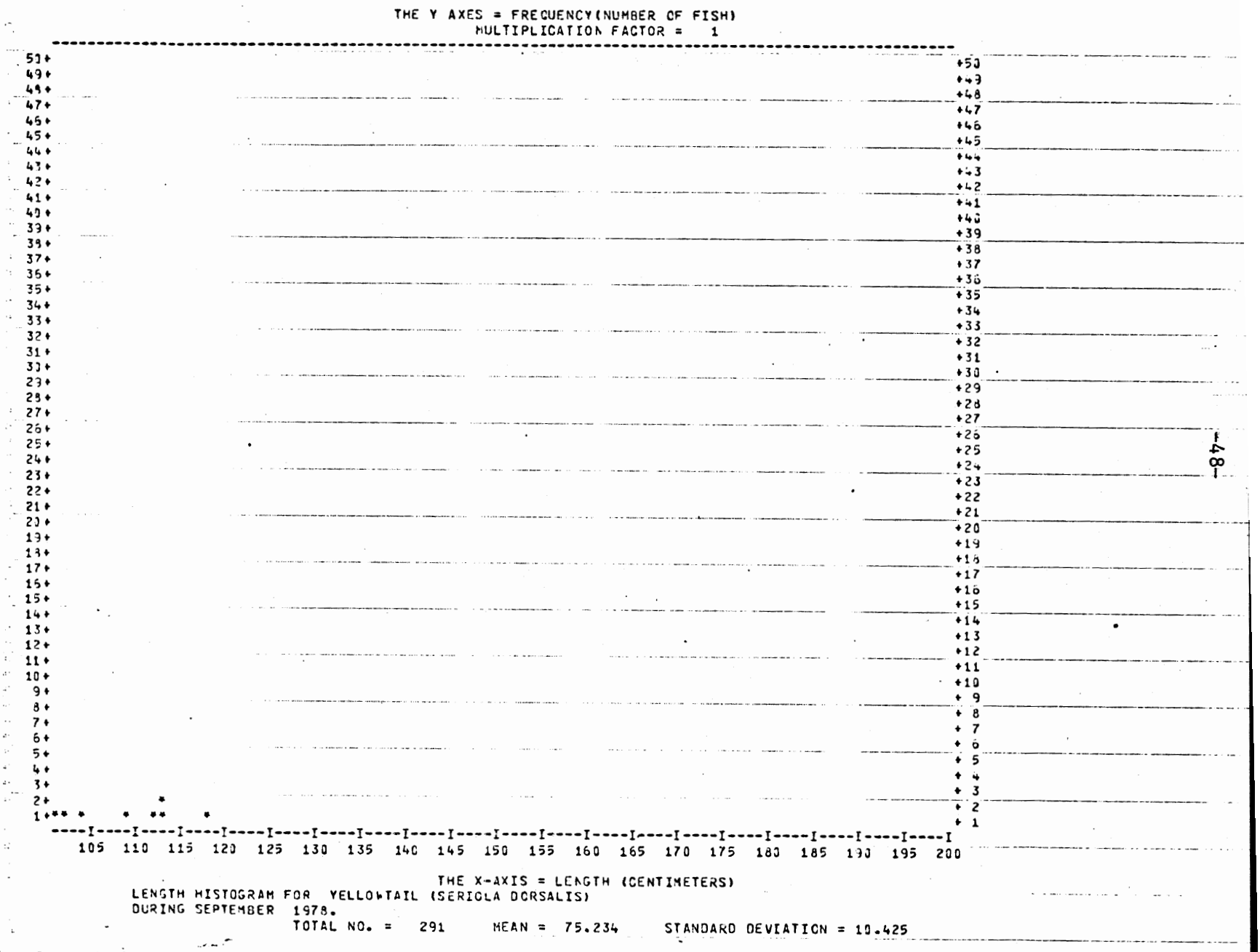


FIGURE 35. Length frequencies of yellowtail for September 1978.
Total No. Quarter 588 Mean Length Quarter 81.737 cm

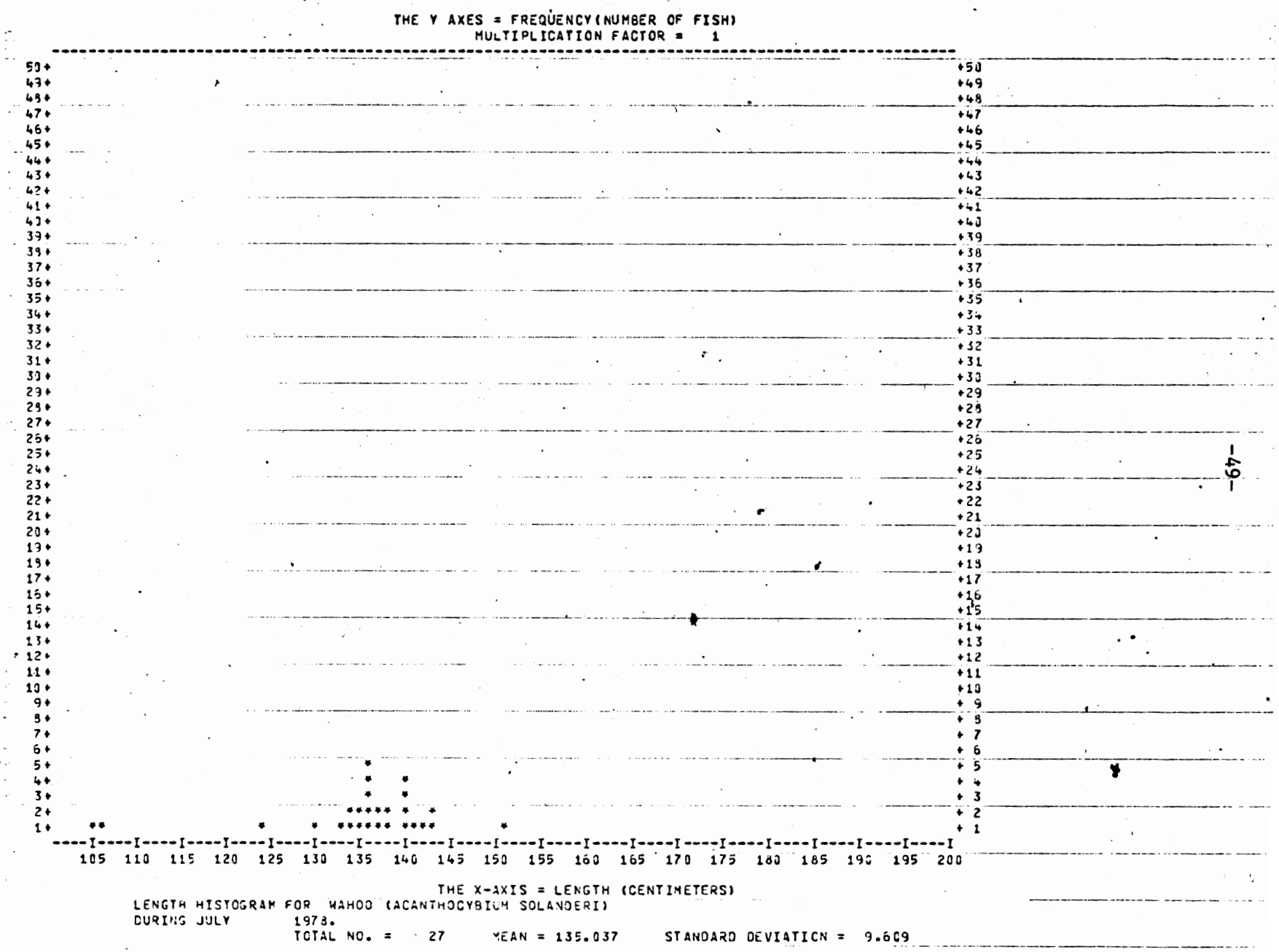


FIGURE 36. Length frequencies of wahoo for July 1978.

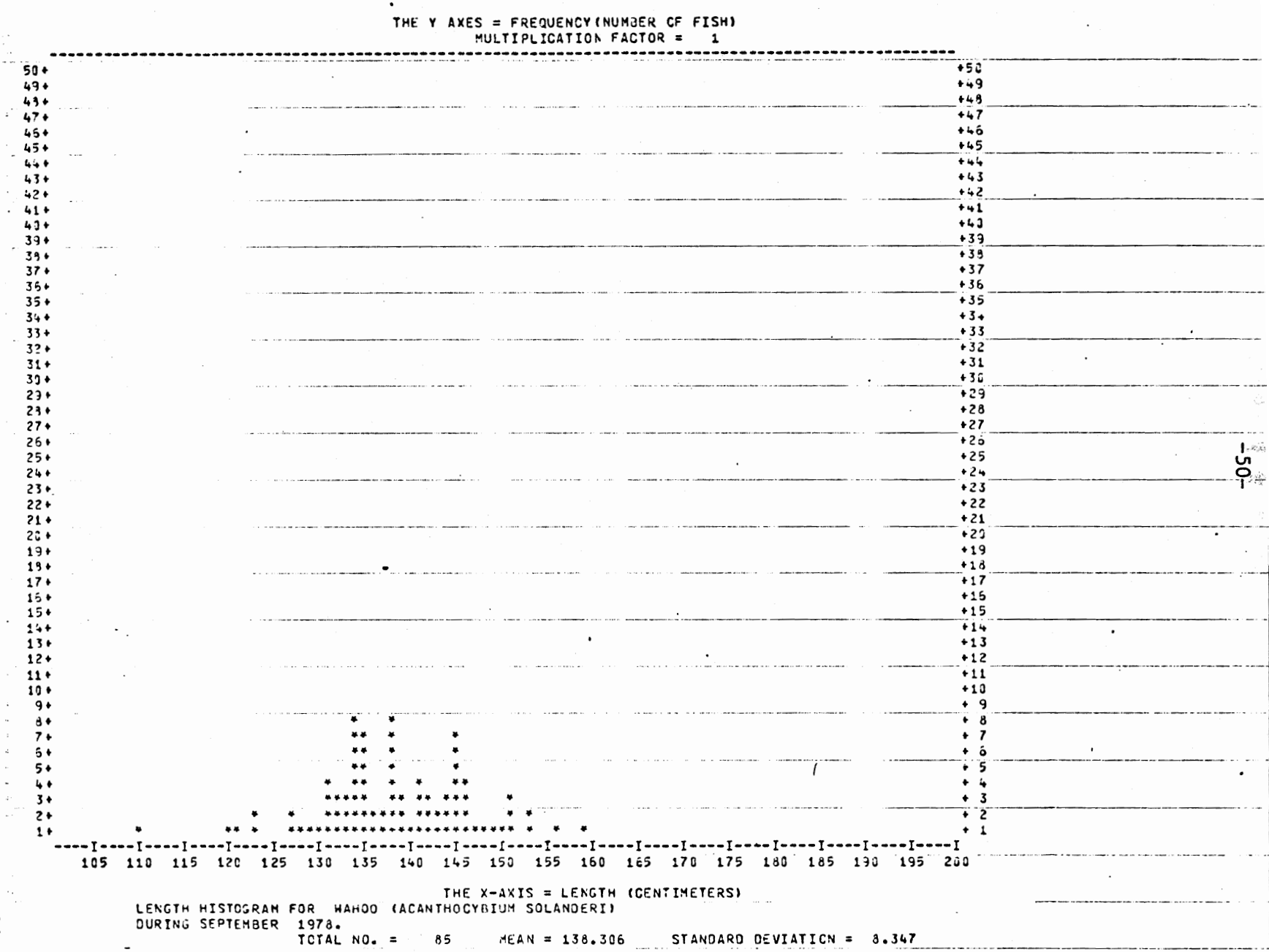


FIGURE 37. Length frequencies of wahoo for September 1978.
Total No. Quarter 112 Mean Length Quarter 137.518 cm

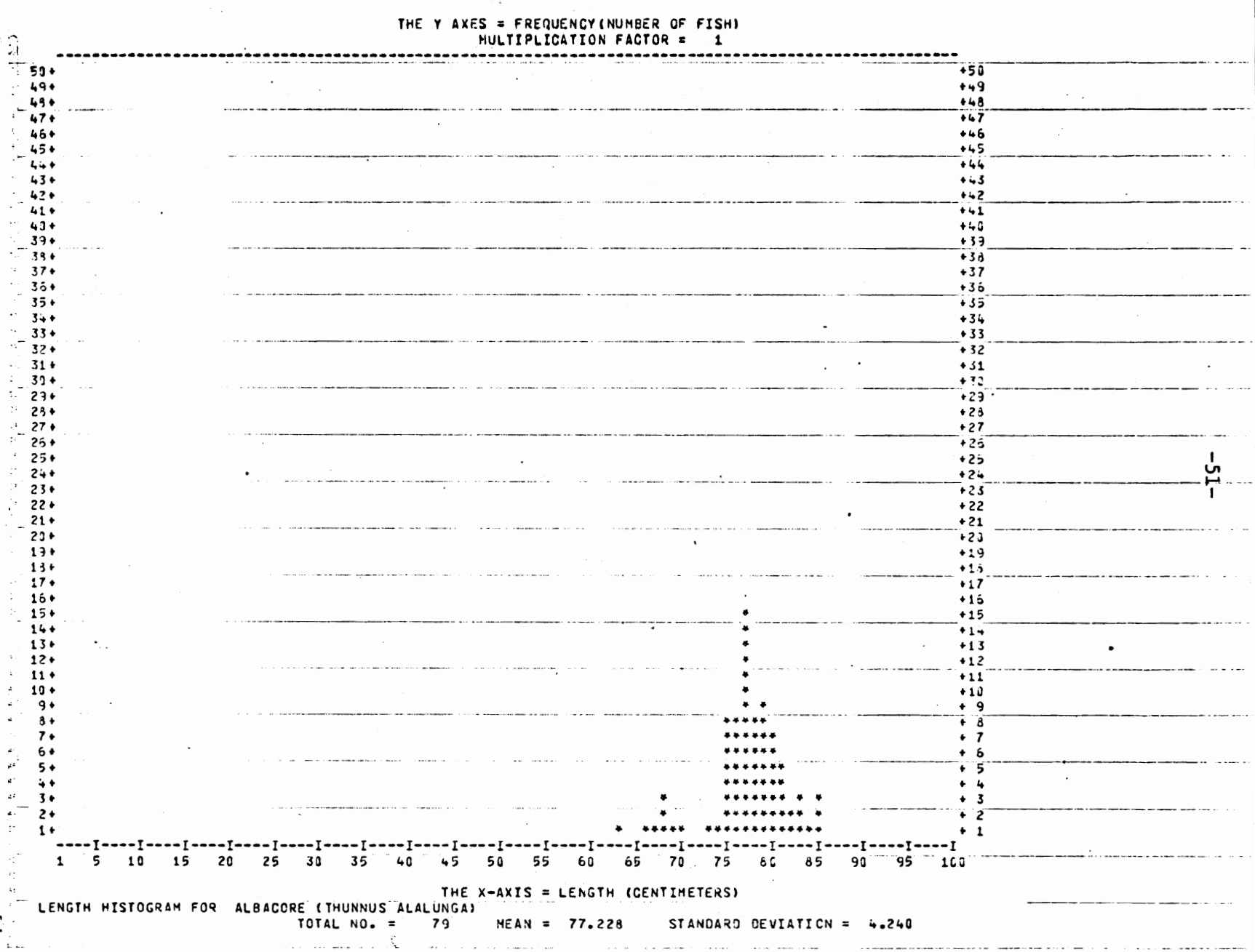


FIGURE 38. Length frequencies of albacore for September 1978.
Total No. Quarter 79 Mean Length Quarter 77.228 cm

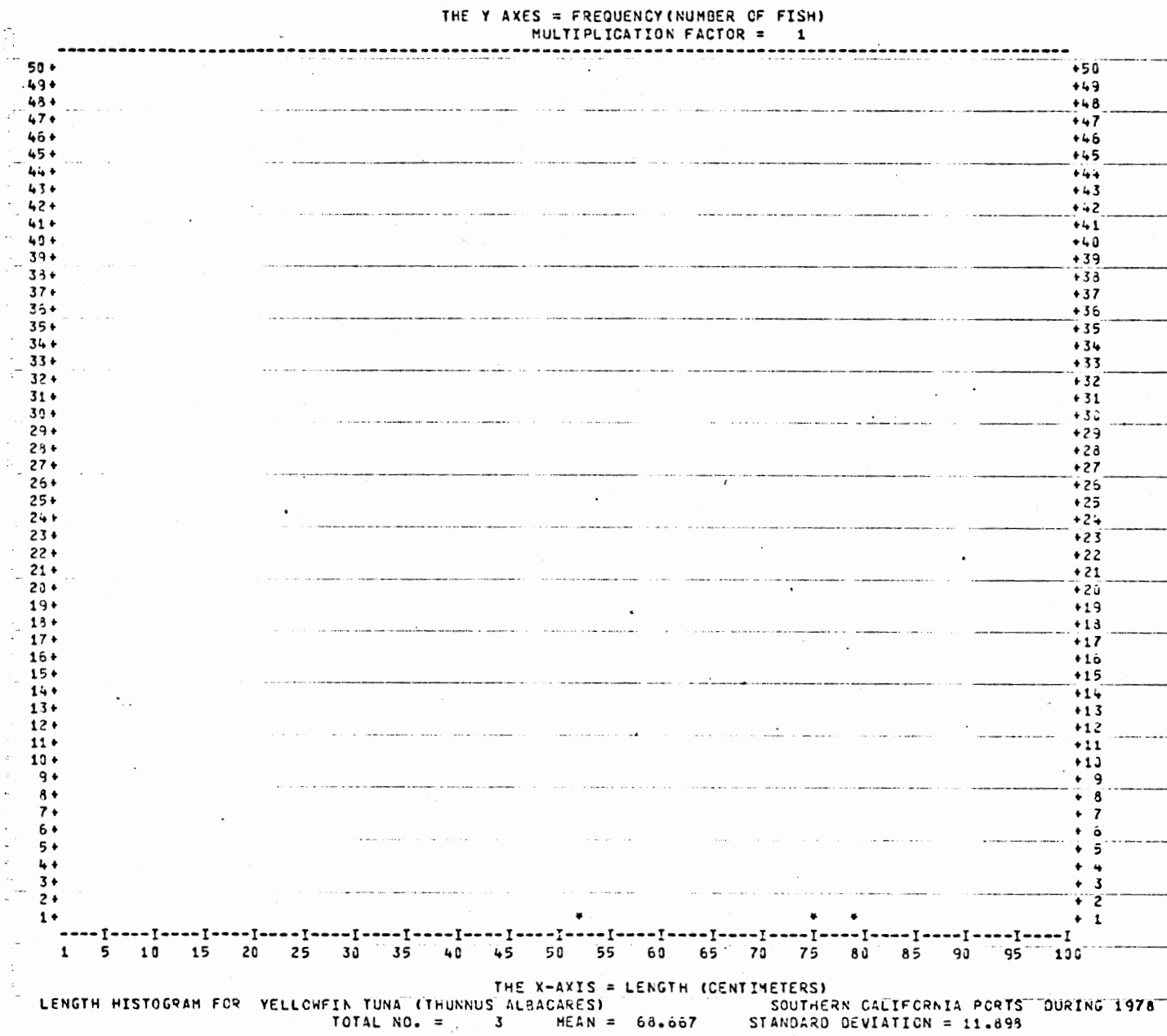
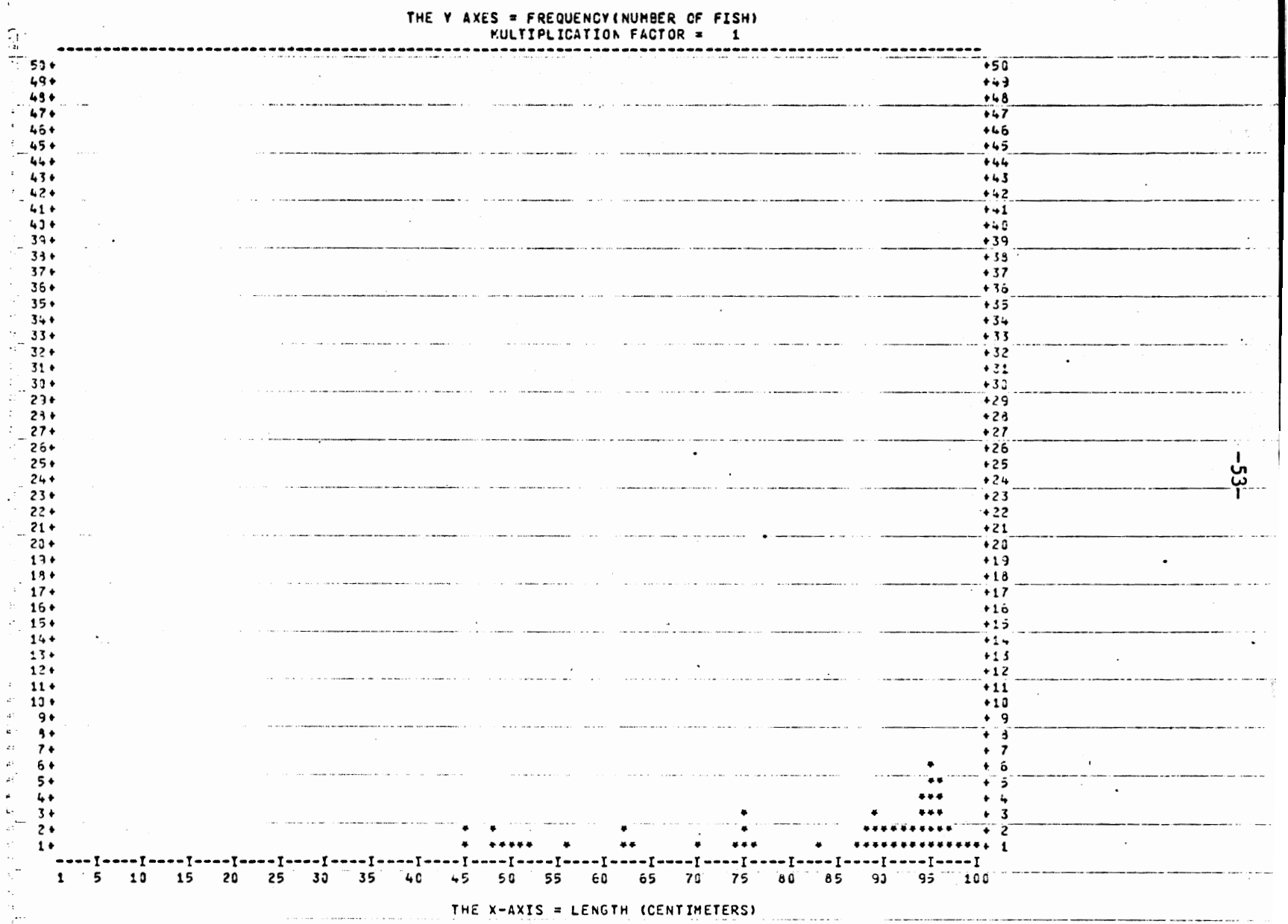


FIGURE 39. Length frequencies of yellowfin tuna for July 1978.


THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1
THE X-AXIS = LENGTH (CENTIMETERS)

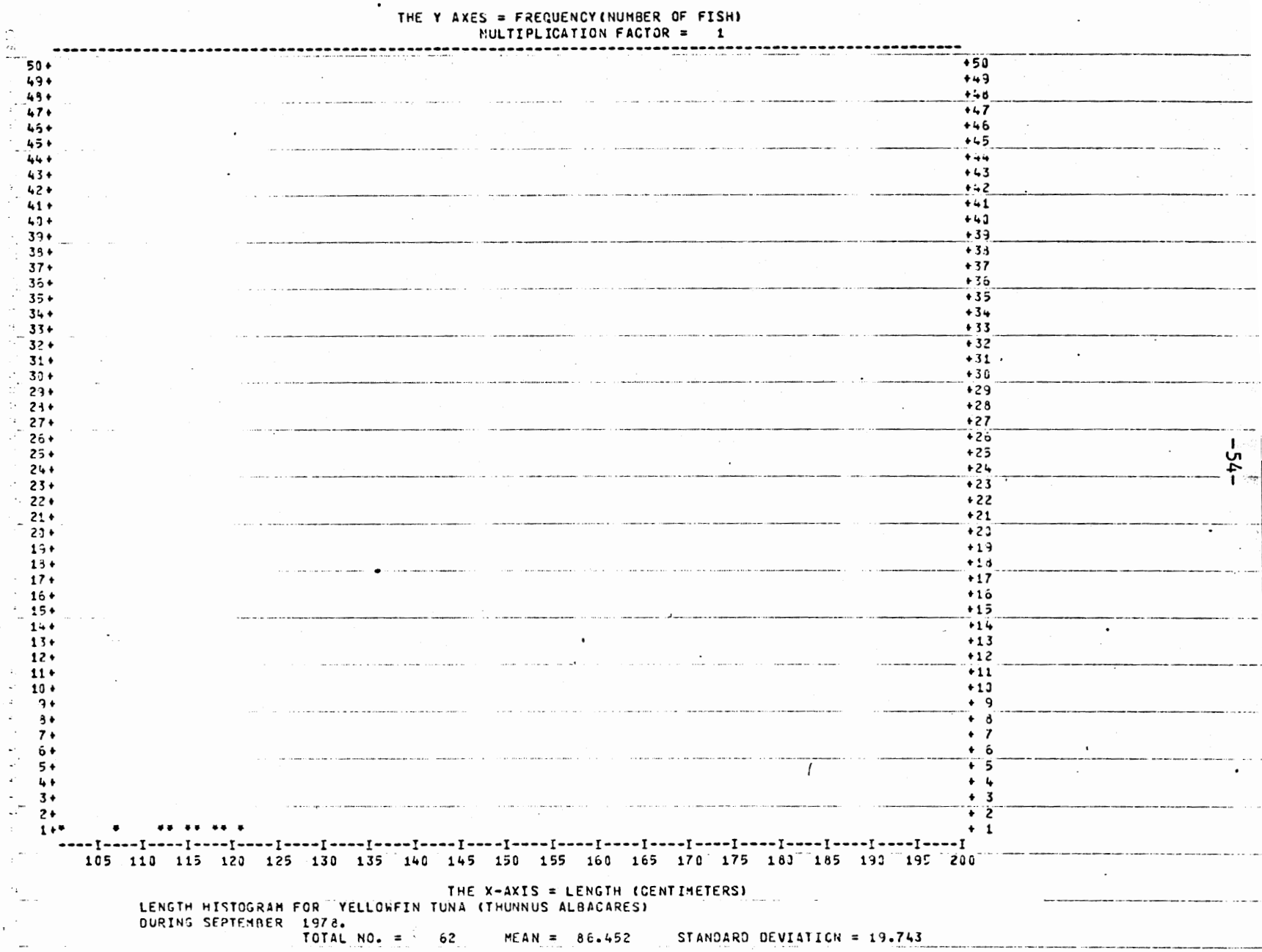


FIGURE 40. Length frequencies of yellowfin tuna for September 1978.
Total No. Quarter 65 Mean Length Quarter 85.632 cm

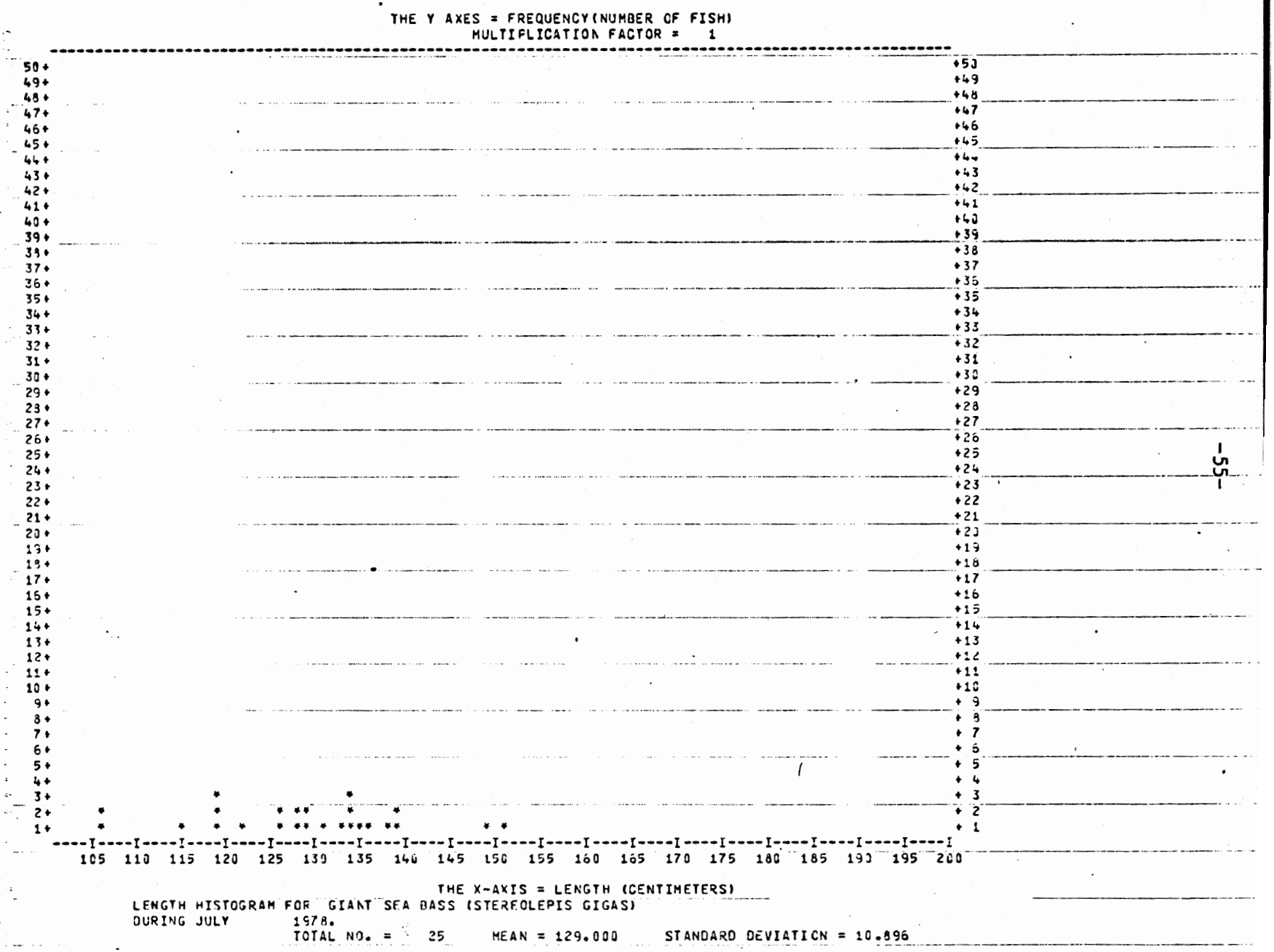
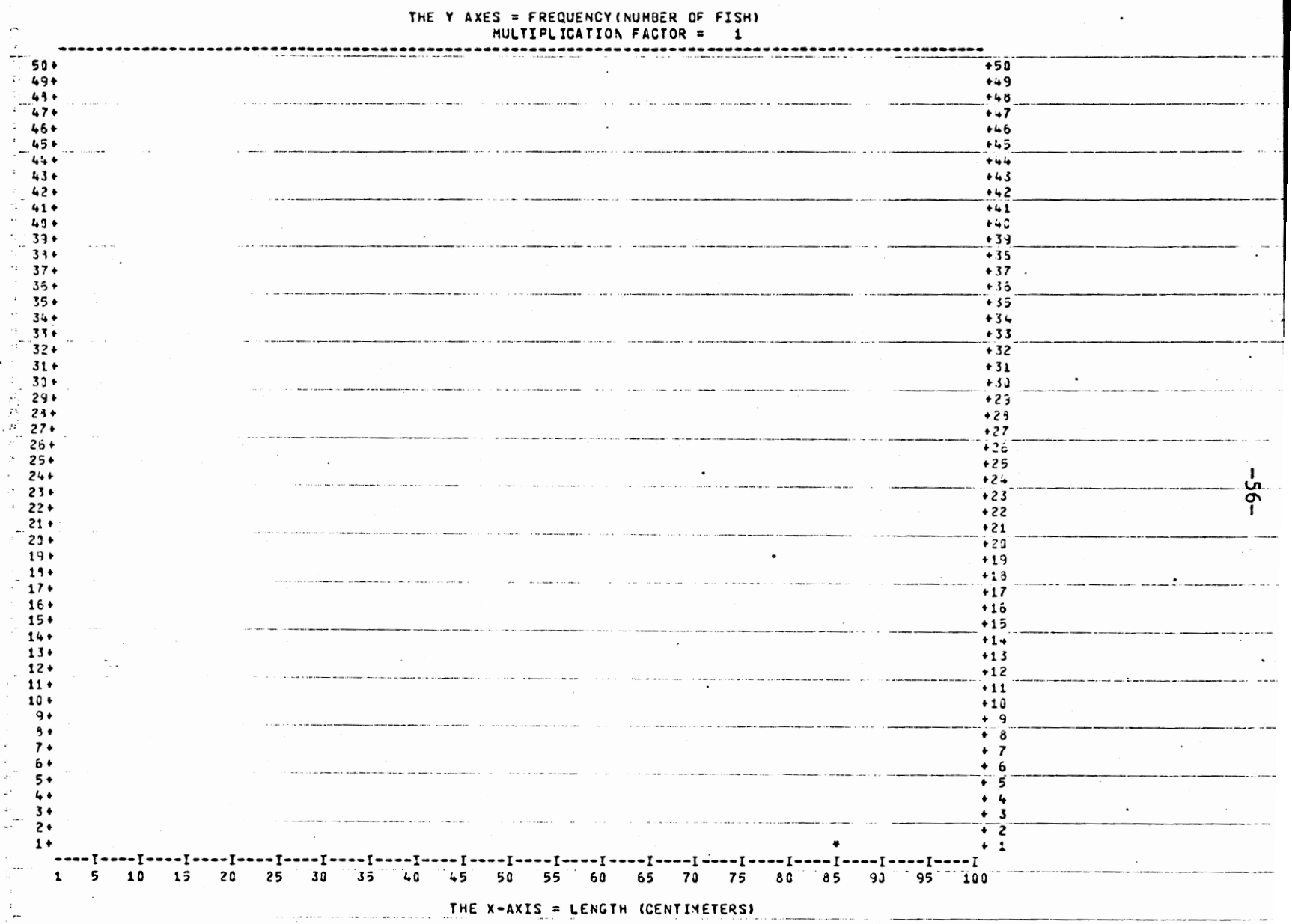


FIGURE 41. Length frequencies of giant sea bass for July 1978.


THE Y AXES = FREQUENCY(NUMBER OF FISH)
MULTIPLICATION FACTOR = 1
50+ +50
49+ +49
48+ +48
47+ +47
46+ +46
45+ +45
44+ +44
43+ +43
42+ +42
41+ +41
40+ +40
39+ +39
38+ +38
37+ +37
36+ +36
35+ +35
34+ +34
33+ +33
32+ +32
31+ +31
30+ +30
29+ +29
28+ +28
27+ +27
26+ +26
25+ +25
24+ +24
23+ +23
22+ +22
21+ +21
20+ +20
19+ +19
18+ +18
17+ +17
16+ +16
15+ +15
14+ +14
13+ +13
12+ +12
11+ +11
10+ +10
9+ + 9
8+ + 8
7+ + 7
6+ + 6
5+ + 5
4+ + 4
3+ + 3
2+ + 2
1+ + 1
1 5 10 15 20 25 30 35 40 45 50 55 60 65 70 75 80 85 90 95 100
THE X-AXIS = LENGTH (CENTIMETERS)

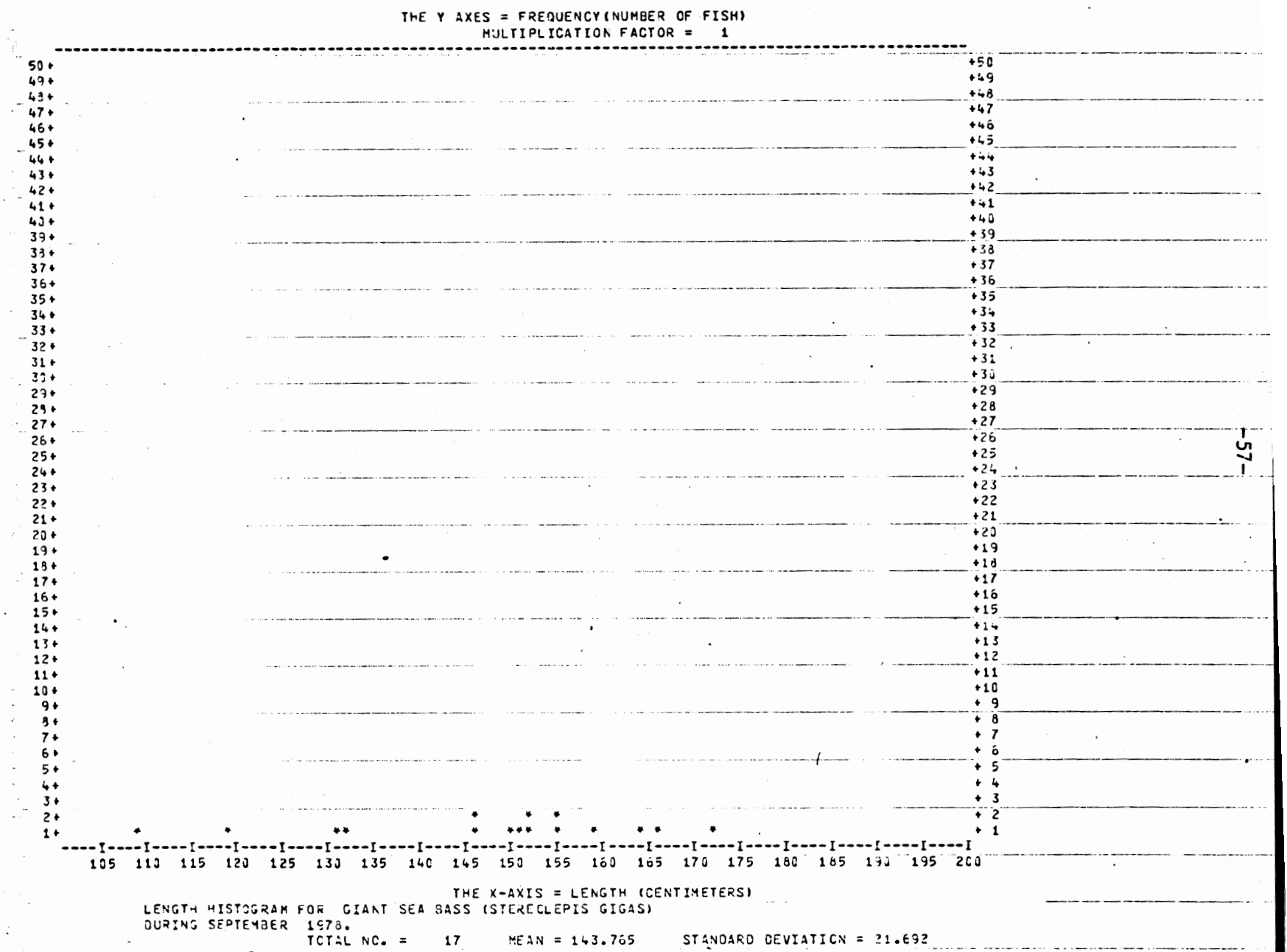


FIGURE 42. Length frequencies of giant sea bass for September 1978.
Total No. Quarter 42 Mean Length Quarter 134.977 cm